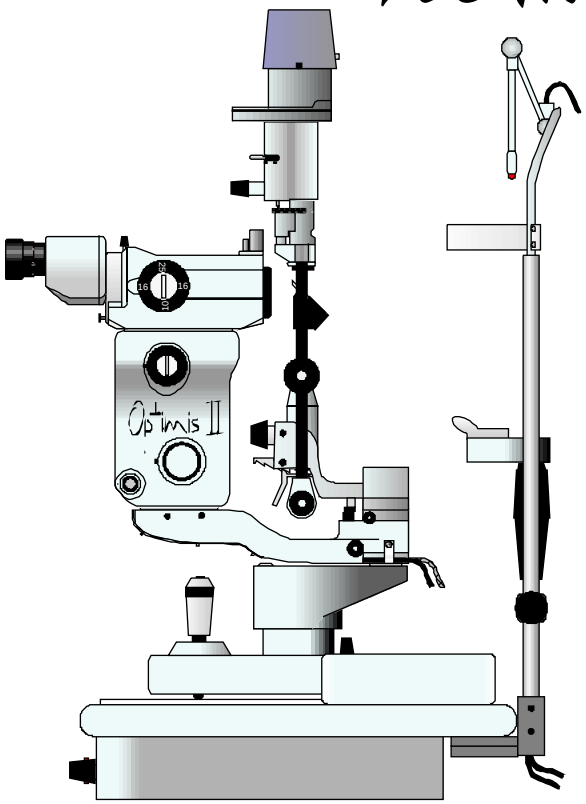
Quantel medical

Optimis II

1064NM LASER



OPHTHALMIC LASER

SERVICE MANUAL

XL OPT2 MT AN **MAY 2005**

QUANTEL MEDICAL SA

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WARNINGS

WARRANTY : - Any adjusting and calibrating procedure described in this manual shall be performed only by Technicians previously trained by Quantel Medical.

- Any faulty part will be replaced by a strictly identical one provided by Quantel Medical.

- For safety reasons, Quantel Medical considers any Laser module and electronic PC Board as whole partial assembly :
* Defective PC Boards will be returned to Quantel Medical for replacement
* Warranty will not be applied if a PC Board has been damaged during an intervention or attempt to repair.

Warranty will not be applied unless these recommendations are strictly respected.

CAUTIONS : All technicians will carefully respect all the safety instructions herein described in this Service manual.

WARNING : Special training by Quantel Medical for technicians is necessary to ensure optimum adjustment and maximum reliability of the whole instrument.

WARNINGS

LASER SAFETIES :

All staff using this laser system, or in charge of its maintenance, must be aware of the following basic precautions to be taken :

1- Never look straight into the beam or into any reflecting object able to reflect the beam.

2- Limit the laser room access to the requested personnel only, who is already aware of the precautions to be taken.

3- The laser room must be indicated with the specially designed labels.

4- Never direct the laser beam towards an aperture.

5- Never expose any reflective object or shiny surface to the direct beam path.

6- Switch off the instrument correctly after each use.

WARNING : Laser power up to 30mJ at 1064 nm and laser Aiming beam 637 nm up to 1 mW, may be accessible upon removal of console cover.

DO NOT remove the cover unless instructed to do so by a factory-trained technician.

Anyone in the room during service or maintenance must wear **protective safety goggles.**

Please check carefully these Protective Glasses are adequate for the laser wavelength present in the OPTIMIS II :

- Protection at 1064 nm : Reference N° 91 - B980 - 1100 OD6 - L5.

CAUTION : Use of controls or adjustments or performances other than those specified herein may result in hazardous radiation exposure.

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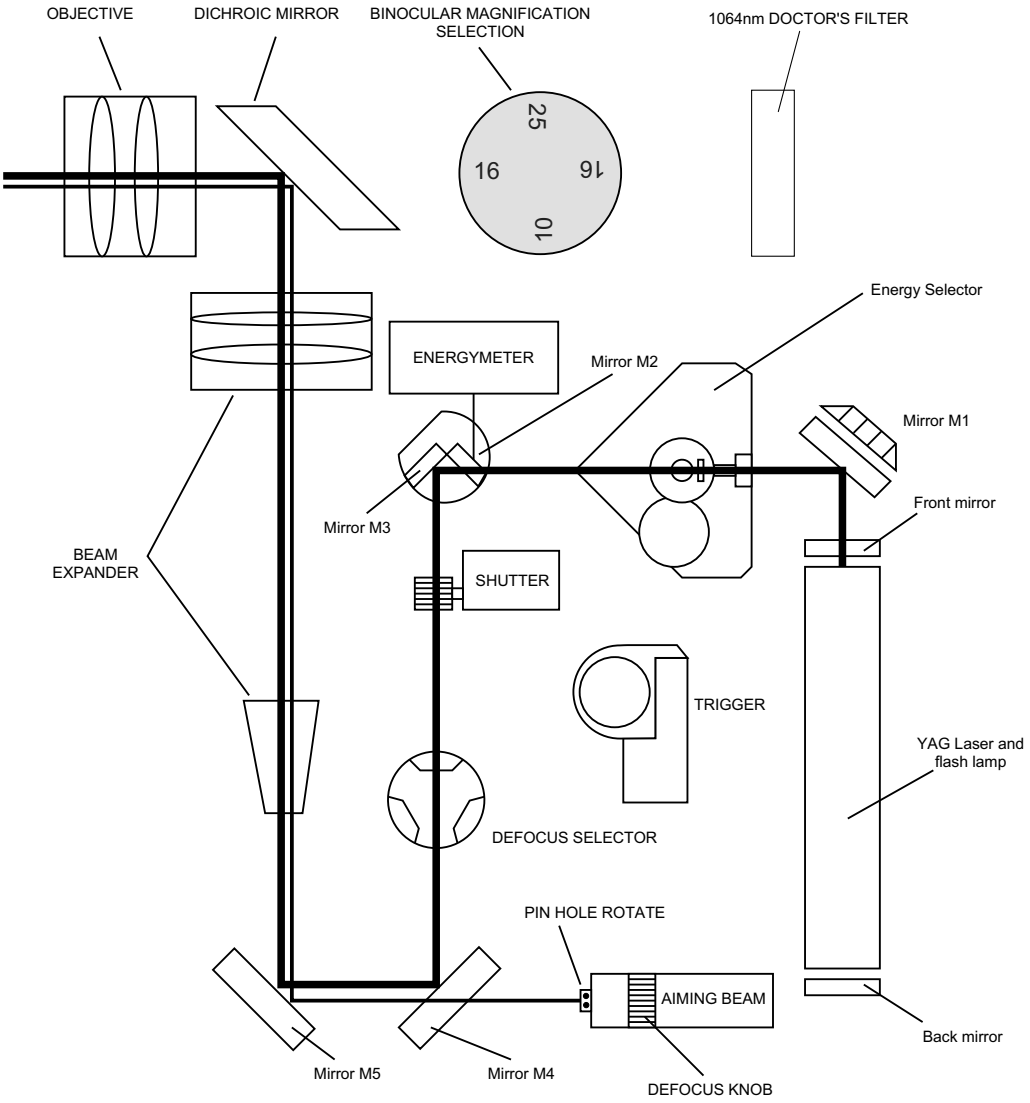
CHAPTER 1

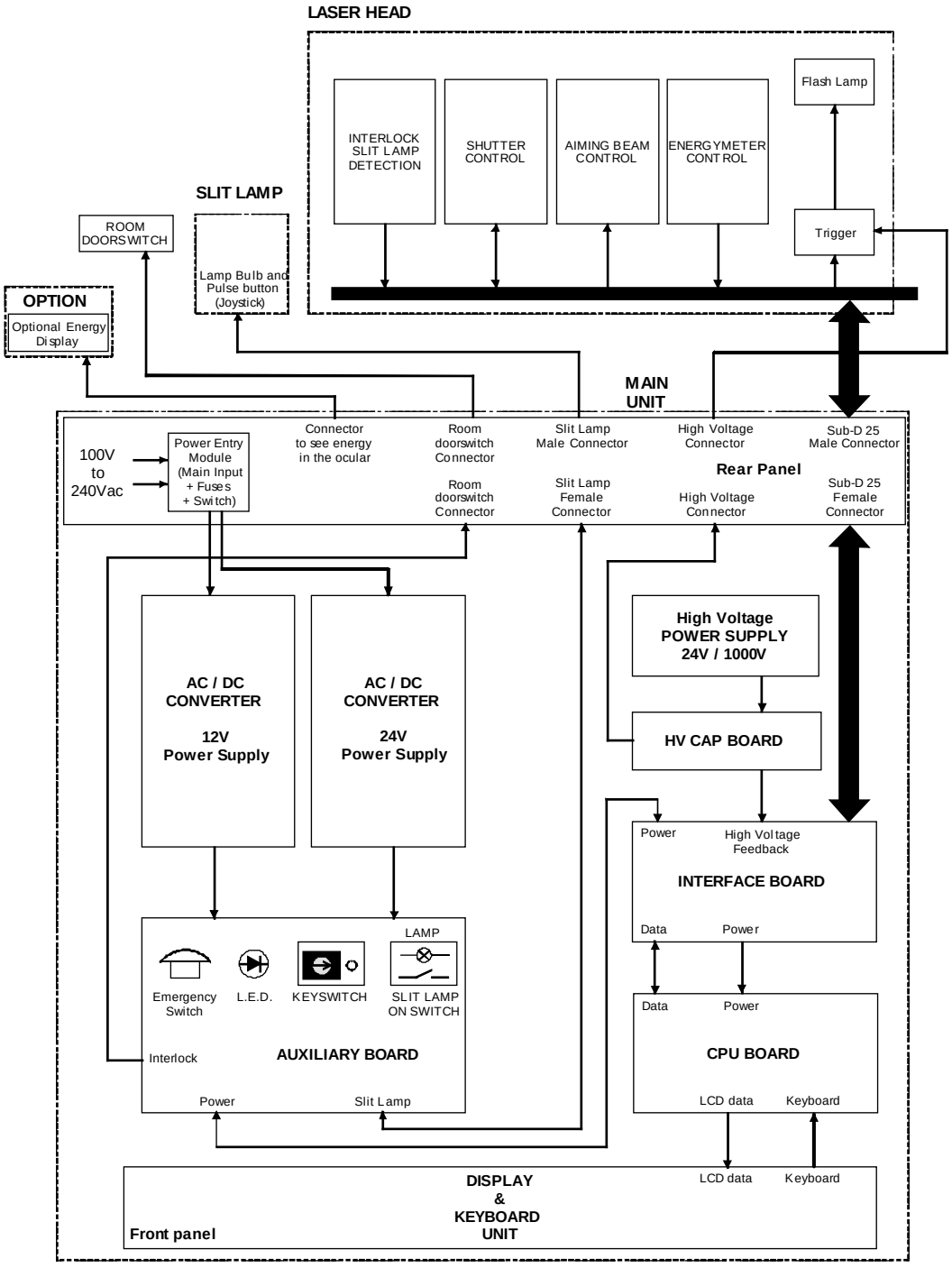
BLOCK AND WIRING DIAGRAMS

1 - BLOCK AND WIRING DIAGRAMS

1-1 OPTICAL BLOCK DIAGRAM



1-2 OVERALL BLOCK DIAGRAM



1-3 DESCRIPTION OF THE SYSTEM

System is composed of two main sub assemblies:
- **MAIN UNIT : Laser Console,**
- **LASER HEAD : Slit Lamp.**

MAIN UNIT is a metal enclosure containing all of electronics sub units. On the top of it, there is SLIT LAMP which holds LASER HEAD. MAIN UNIT and LASER HEAD are connected to each other with two cables : SIGNAL CABLE (CABLE1) and HIGH VOLTAGE CABLE.

1-3-1 MAIN UNIT

MAIN UNIT is a metal enclosure containing all of electronics sub units:

- MAIN POWER SUPPLY / SWITCH / FUSE UNIT,
- MAIN DC POWER SUPPLY,
- AUXILIARY BOARD,
- INTERFACE BOARD,
- CPU BOARD,
- HIGH VOLTAGE CAPACITOR BOARD,
- HIGH VOLTAGE POWER SUPPLY BOARD,
- DISPLAY / KEYBOARD UNIT,
- BACK PANEL CONNECTORS.

1-3-1-1 MAIN POWER SUPPLY / SWITCH / FUSE UNIT

There are two separate fuses : one for Line and other for Neutral : Fuses are 4AT/250V.

1-3-1-2 MAIN POWER SUPPLY (12V or 24V)

Input is : 85 to 264 VAC, 47 to 63 Hz with maximum input current of 1,2A.
Output is 12VDC or 24VDC and it can with covered enclosure deliver up to 40W.

1-3-1-3 AUXILIARY BOARD

AUXILIARY BOARD distributes the electrical power to all sub-units and control the front panel.
It is connected to MAIN POWER SUPPLY.
System can be switched ON again only, if the push button is rotated to ON position. There are two options to turn ON the SLIT LAMP :
- first if user only wants to use SLIT LAMP without turning on the laser: SLIT LAMP can be turned ON by pressing illuminated green SLIT LAMP SWITCH. When the green light is ON, the slit lamp is lighted.
- second if user wants to use SLIT LAMP together with the laser : he turns ON KEY SWITCH also the SLIT LAMP is lighted.

SLIT LAMP is connected to auxiliary board on the back panel LASER CONSOLE.
The joystick pulse button and the lamp are controlled by this board.

1-3-1-4 INTERFACE BOARD

The INTERFACE Board (optocoupler interface) converts and distributes electric power to other boards and laser head.

Its main functions are :

- power regulation : 5V voltage regulator (display),
  12V voltage regulator (aiming beam).
- galvanic isolation : DC/DC power converter.
- digital and analog optocouplers isolation : computer signals.
- hardware control :
  - footswitch,
  - high voltage,
  - energy meter,
  - shutter position,
  - computer watch-dog.
- drivers for ENERGY OPTIONAL DISPLAY.
- speaker control.
- number of laser pulses selection and controlling of high voltage power supply are on this board.

1-3-1-5 CPU BOARD

CPU BOARD is connected to INTERFACE BOARD via two connectors :
- one connector feeds all the digital and analog signals
- the other connector is for Computer power supply.

The CPU Board is the heart of the system :
- control of the display and front panel functions,
- control the High Voltage Capacitor Board via the interface board,
- control the laser head via the interface board.

1-3-1-6 HIGH VOLTAGE CAPACITOR BOARD

HIGH VOLTAGE CAPACITOR BOARD is connected to INTERFACE BOARD.

The flash lamp of the laser head is supplied and controlled by this board.

The high voltage is checked by the CPU Board (safety detection).

1-3-1-7 DISPLAY / KEYBOARD

DISPLAY / KEYBOARD unit is connected directly to Computer board.

Power for the back-light LED is fed from Interface board (5V).
Computer also controls via Interface two front panel LED diodes (green for Stand-by and yellow for Ready) which are above STAND-BY / READY button.

There are three keys on the front panel :
- PULSE SELECT BUTTON,
- COUNTER RESET BUTTON,
- STAND-BY / READY BUTTON.

1-3-1-8 BACK PANEL CONNECTORS

BACK PANEL CONNECTORS are :
- Main input,
- Interlock,
- Slit lamp,
- Option,
- Energy display,
- High voltage connector for laser head,
- Signal connector for laser head,
- GND terminal.

1-3-2 LASER HEAD

LASER HEAD is located on the Slit lamp.
It is connected to MAIN UNIT via two cables :
- high voltage cable and signal cable (Cable1),
- signal cable has on Main unit side 25 pins SUB-D connector.

LASER HEAD sub-units are :
- TRIGGER,
- SHUTTER,
- ENERGYMETER,
- AIMING BEAM,
- SLIT / INTERLOCK,
- ENERGY DISPLAY (Option).

1-3-2-1 TRIGGER

The flash lamp of the laser head is power supplied via this trigger board which is controlled by the CPU board.

1-3-2-2 SHUTTER

Purpose of a safety Shutter is to block the Laser pulse when it is not wanted. Shutter is controlled by the CPU board via the Interface board.
There are two position detections : - when the shutter is closed,
- when the shutter is opened.

1-3-2-3 ENERGYMETER

ENERGY METER is measuring the energy of each laser pulse.

The calibration is done at two power levels : - 3mJ with P1.
- 10mJ with P2.

1-3-2-4 AIMING BEAM

Power is provided by a 1mW laser diode with the wavelenght of 637nm. The intensity of a light is set by the knurled potentiometer on the right side of the laser head.

1-3-2-5 SLIT / INTERLOCK

The slit lamp generator position is detected by a magnetic sensor just below.

1-3-2-6 ENERGY DISPLAY

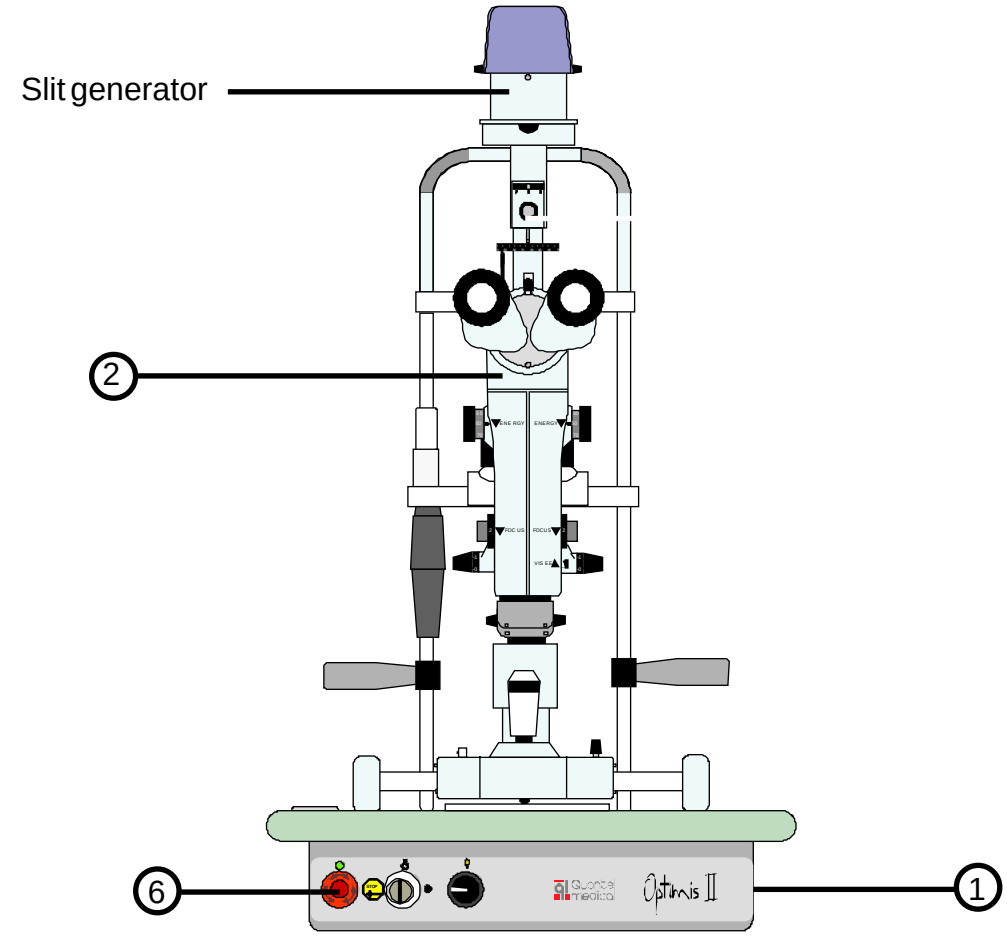
The option Energy display takes place between the oculars and the slit lamp.

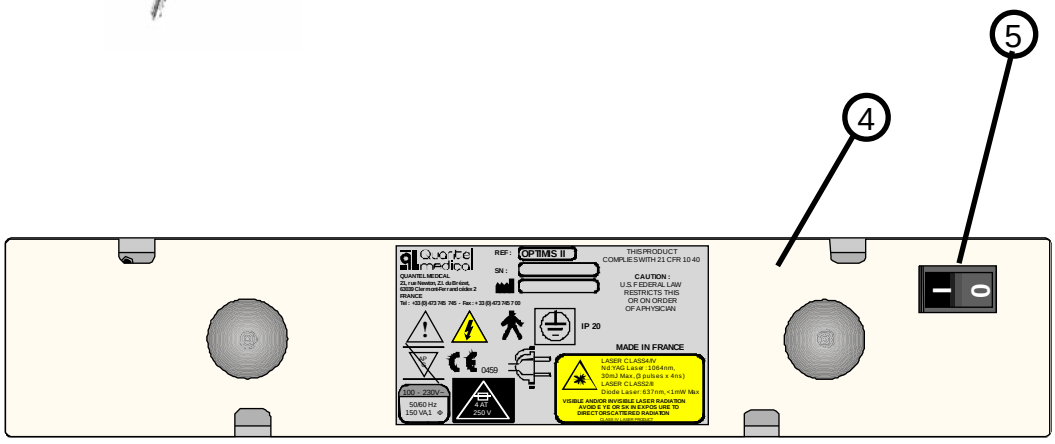
CHAPTER 2

DISASSEMBLING AND INNER VIEWS

2 - DISASSEMBLING AND INNER VIEWS

2-1 OVERALL VIEW

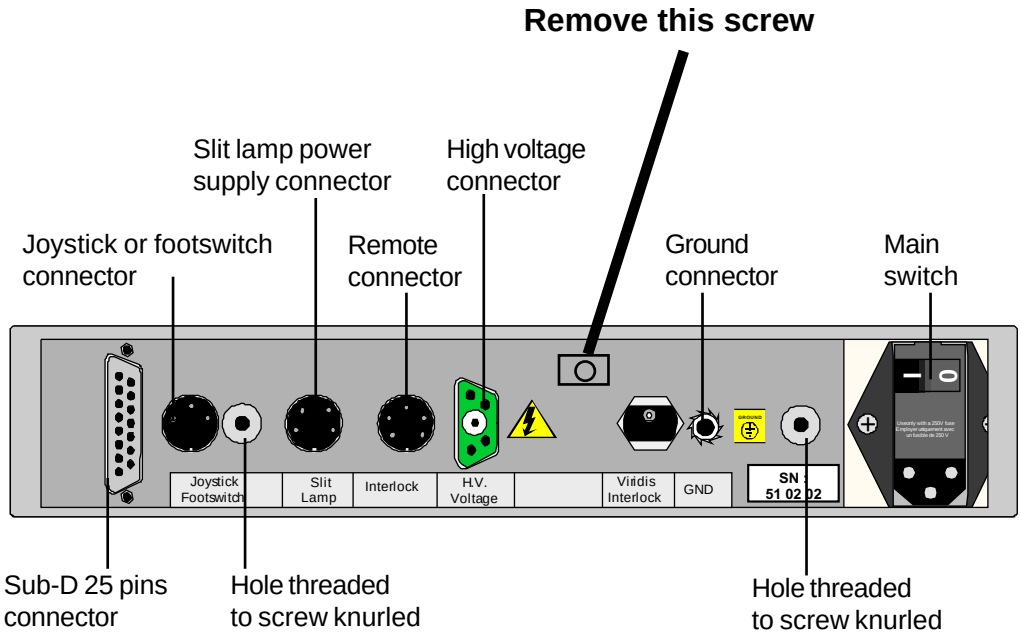




2-2 LASER CONSOLE DISASSEMBLING

WARRANTY VOID IF THE LASER CONSOLE AND LASER HEAD OPENED : WITHOUT ADMISSION OF THE QUANTEL MEDICAL TECHNICAL DEPARTMENT

- To open the laser console, it is necessary to removed all the plugs at the rear of the OPTIMIS II (the power supply plug, the slit lamp plug, High Voltage plug and the slit lamp control plug).
- Remove the locking screw like indicated on the below figure.

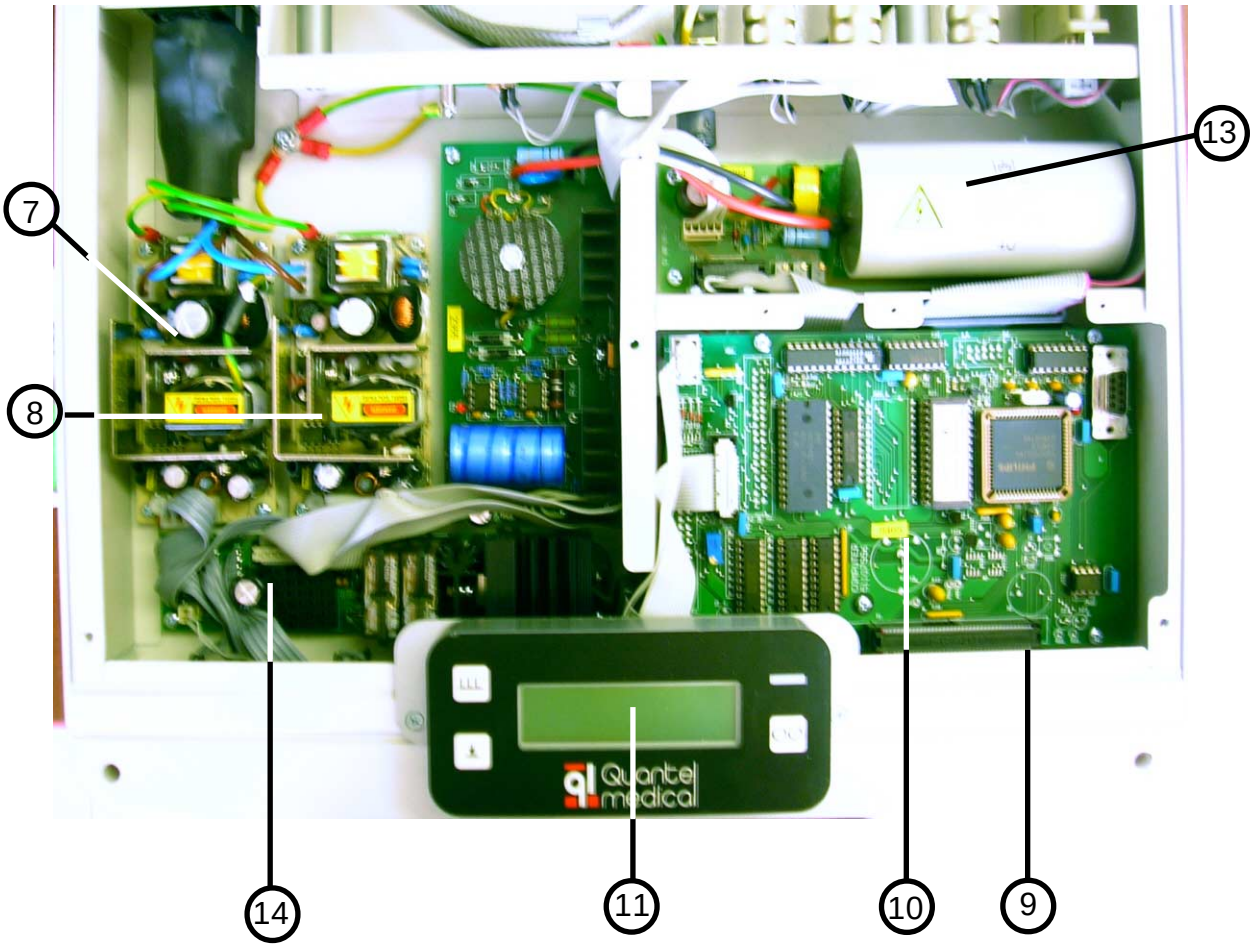


- Slide the Laser Console (pull it to towards the back) to access the inner.

2 - DISASSEMBLING AND INNER VIEWS

2-3 INNER VIEWS OF LASER CONSOLE

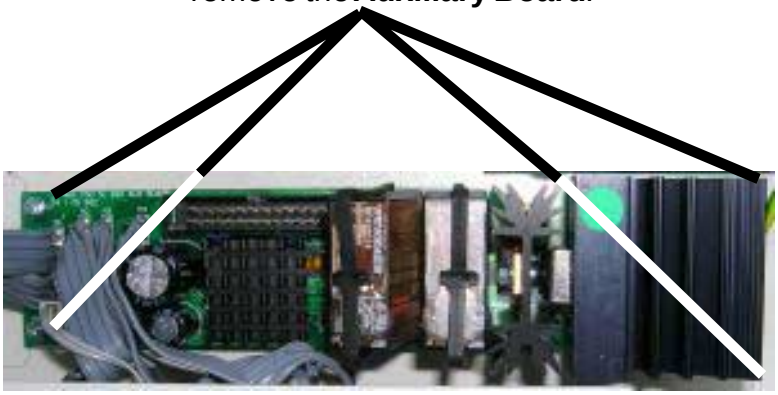
Rear panel



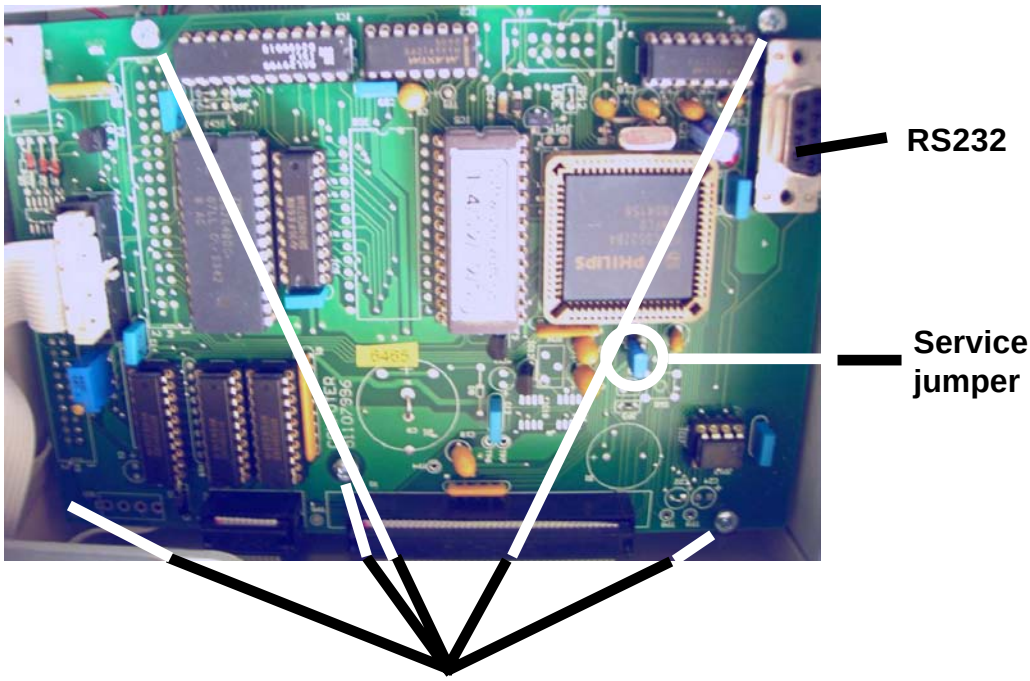
Front panel

2-3-1 AUXILIARY BOARD

Unscrew these 4 screws, to remove the **Auxiliary Board**.



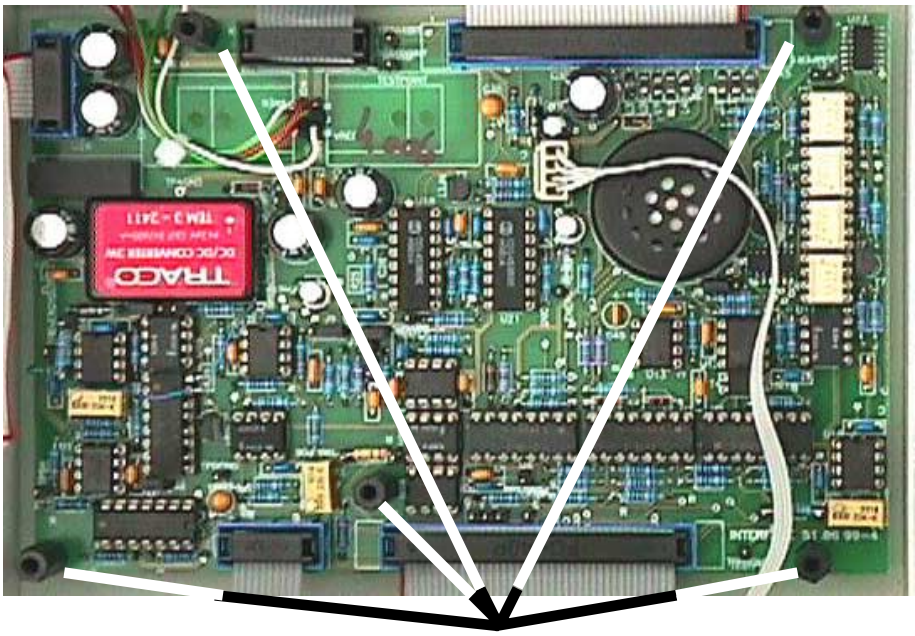
2-3-2 CPU BOARD



Unscrew these 5 screws, to remove **Checking PC Board**.

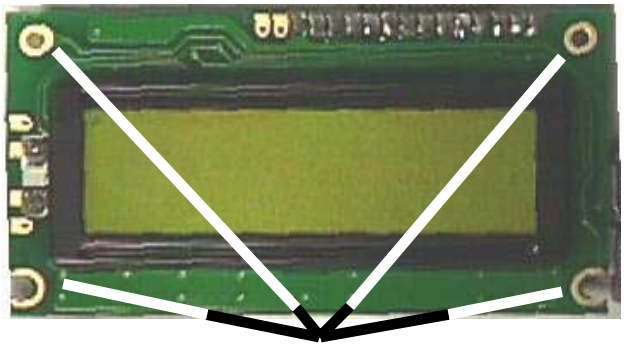
2 - DISASSEMBLING AND INNER VIEWS

2-3-3 INTERFACE BOARD



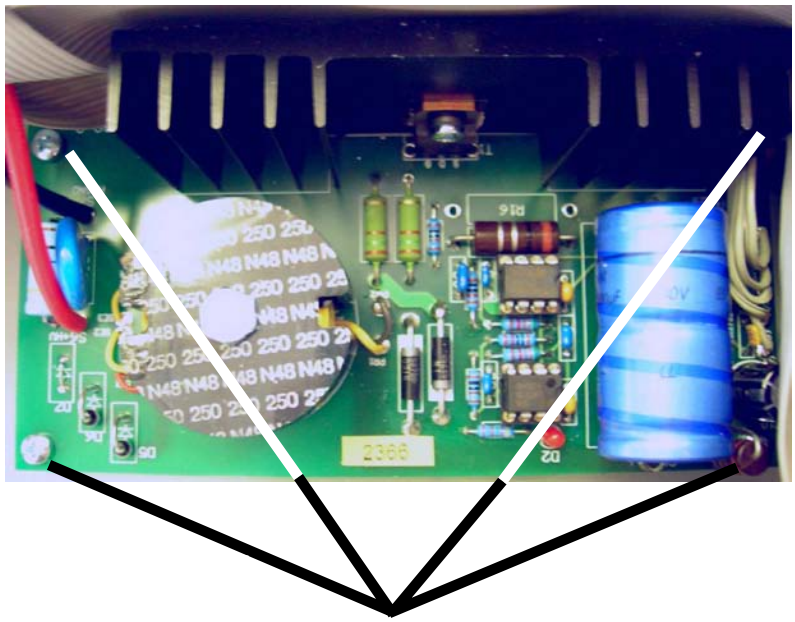
Unscrew these 5 screws, to remove Checking PC Board.
To remove **Interface Board**, you must remove Checking PC Board (see above chapter).

2-3-4 DISPLAY BOARD AND LCD



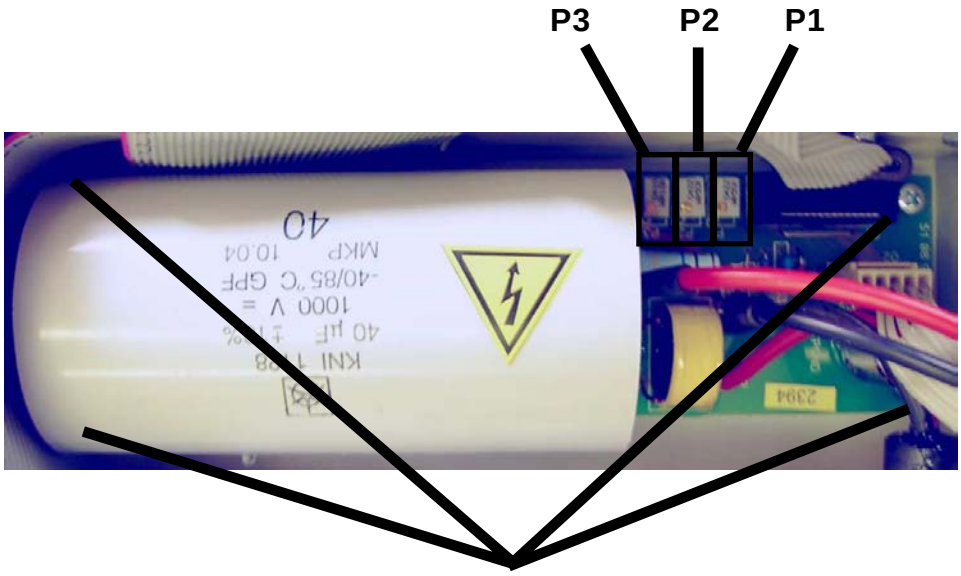
Unscrew these 4 screws, to remove **Display Board**.
To remove display board, you must unmount the Interface and Checking PC Boards, and unmount the front panel.

2-3-5 HIGH VOLTAGE POWER SUPPLY



Unscrew these 4 screws, to remove **High Voltage Power Supply**.

2-3-6 HIGH VOLTAGE CAPACITOR BOARD

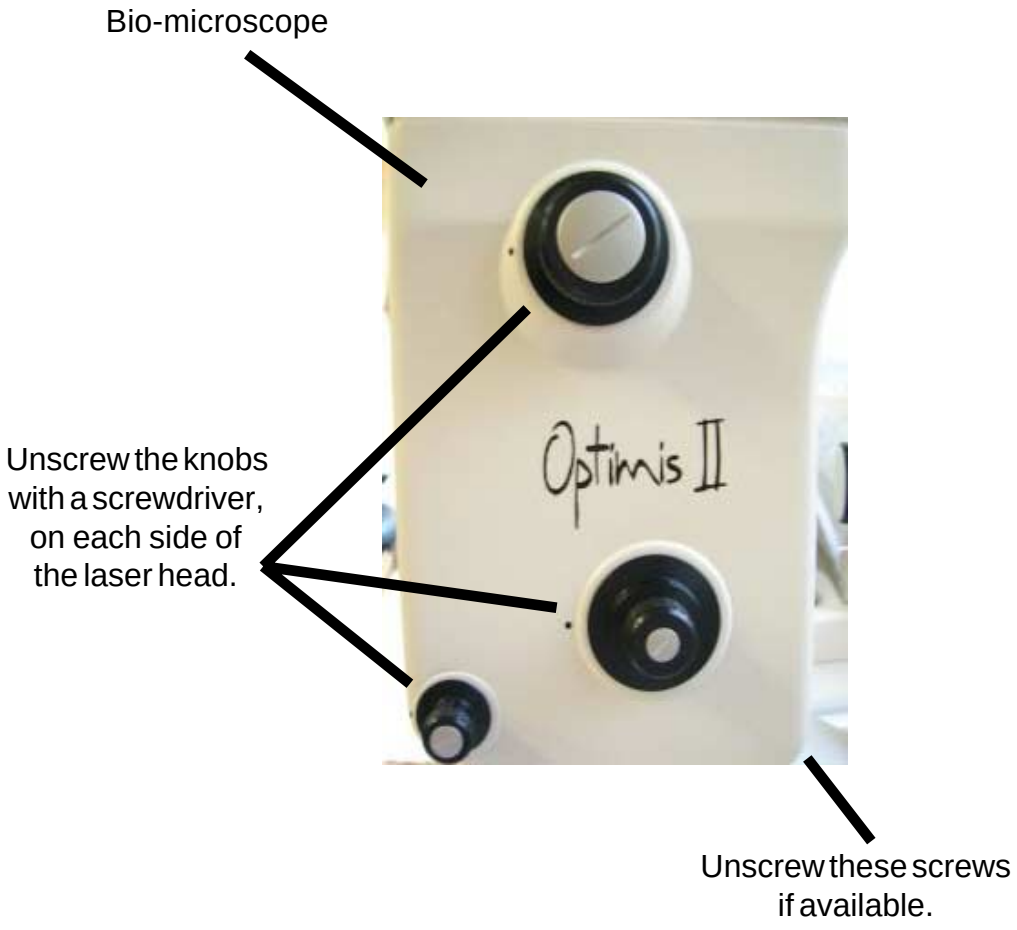


Unscrew these 4 screws, to remove **High Voltage Capacitor Board**.

2 - DISASSEMBLING AND INNER VIEWS

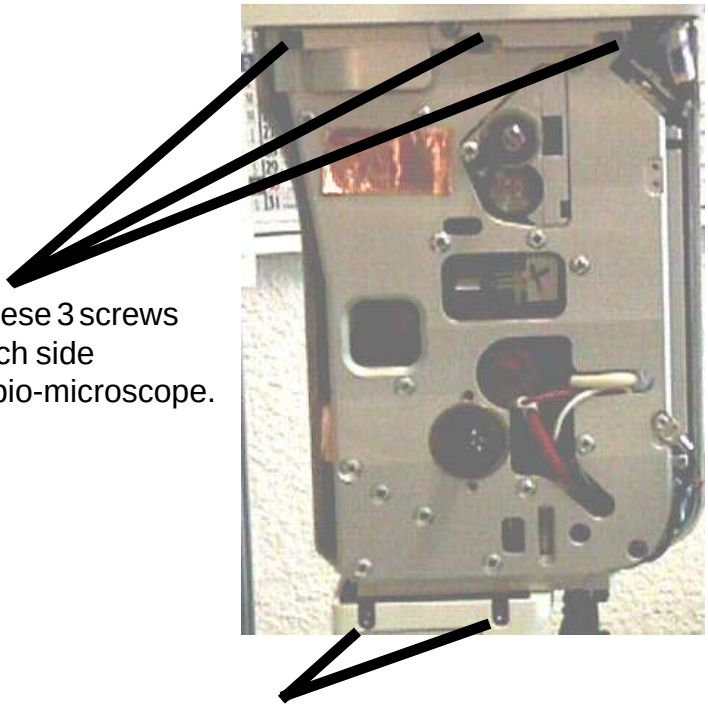
2-4 SLIT LAMP DISASSEMBLING

WARRANTY VOID IF THE LASER CONSOLE AND LASER HEAD OPENED : WITHOUT ADMISSION OF THE QUANTEL MEDICAL TECHNICAL DEPARTMENT


Bio-microscope
Unscrew the knobs with a screwdriver, on each side of the laser head.
Optimis II
Unscrew these screws if available.

After the knobs unmounting, it is necessary to untighten the screws under the knobs (focus and visee) to remove the both covers (left and right).

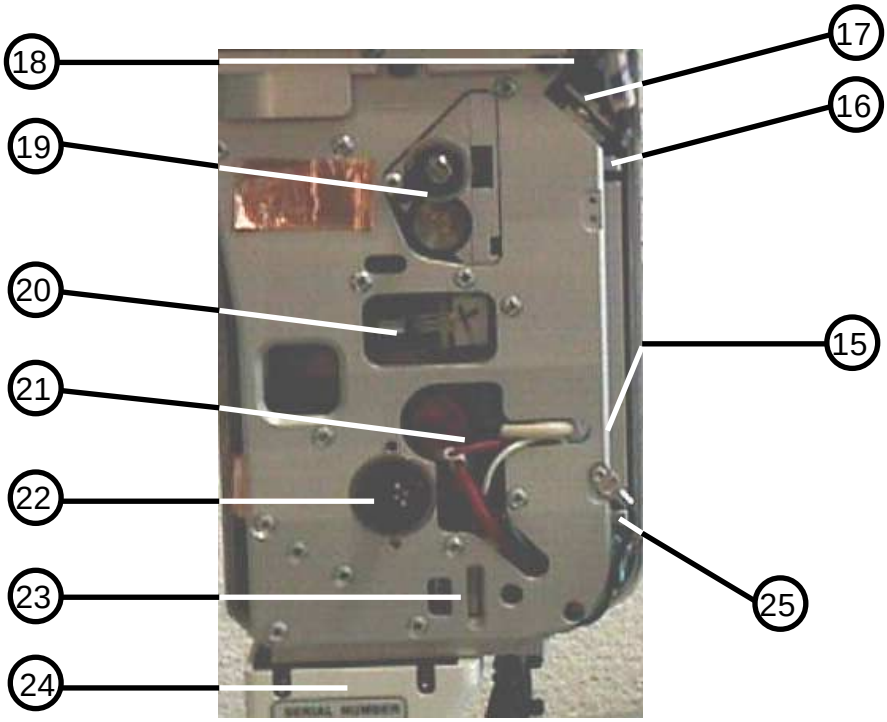
Bio-microscope and slit lamp disassembling



Untighten these 3 screws
on each side
to remove the bio-microscope.

2 screws, to remove and to adjust
laser head of its holder.

2-5 INNER VIEWS OF LASER HEAD



2 - DISASSEMBLING AND INNER VIEWS

2-6 SPARE PARTS

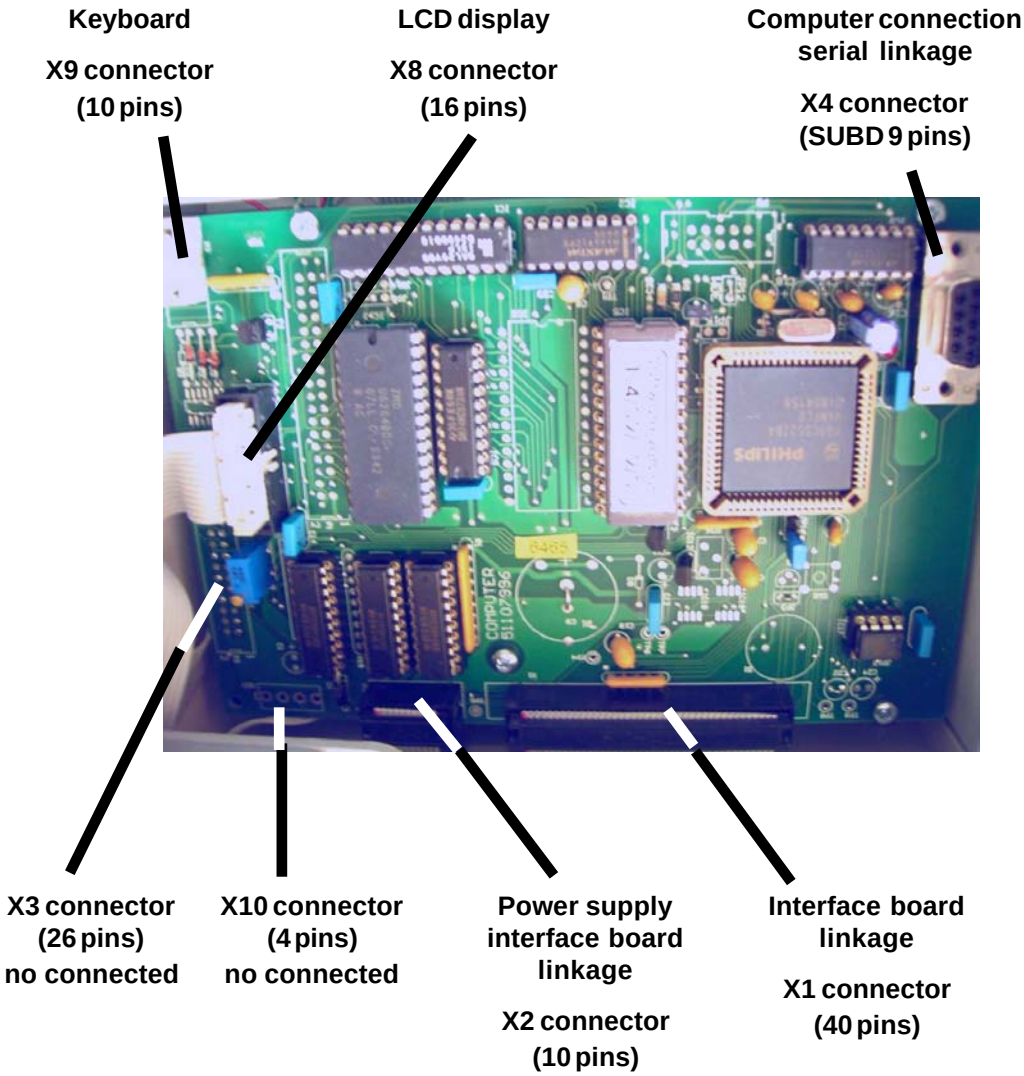
REPERE	IDENTIFICATION	CODE
1	MAIN UNIT (LASER CONSOLE)	
2	LASER HEAD (SLIT LAMP)	
3	KEYS PACK	
4	REAR PANEL	
5	MAINS PLUG BLOCK + FUSES	
6	EMERGENCY STOP BUTTON	
7	24V POWER SUPPLY BLOCK	
8	12V POWER SUPPLY BLOCK	
9	INTERFACE BOARD (UNDER CPU BOARD)	
10	CPU BOARD	
11	DISPLAY BOARD AND LCD	
12	HIGH VOLTAGE POWER SUPPLY BOARD	
13	HIGH VOLTAGE CAPACITOR BOARD	
14	AUXILIARY BOARD	
15	YAG + FLASH LAMP	
16	FRONT MIRROR	
17	MIRROR M1 : BENDING MIRROR	
18	ENERGYMETER BOARD	
19	ENERGY SELECTOR	
20	SHUTTER	
21	TRIGGER BOARD	
22	DEFOCUS SELECTOR	
23	RED LASER DIODE (637 NM)	
24	LASER HEAD HOLDER	
25	BACK MIRROR	

CHAPTER 3

LOCATION & CONNECTOR PINS DESCRIPTION

3 - LOCATION & CONNECTOR PINS DESCRIPTION

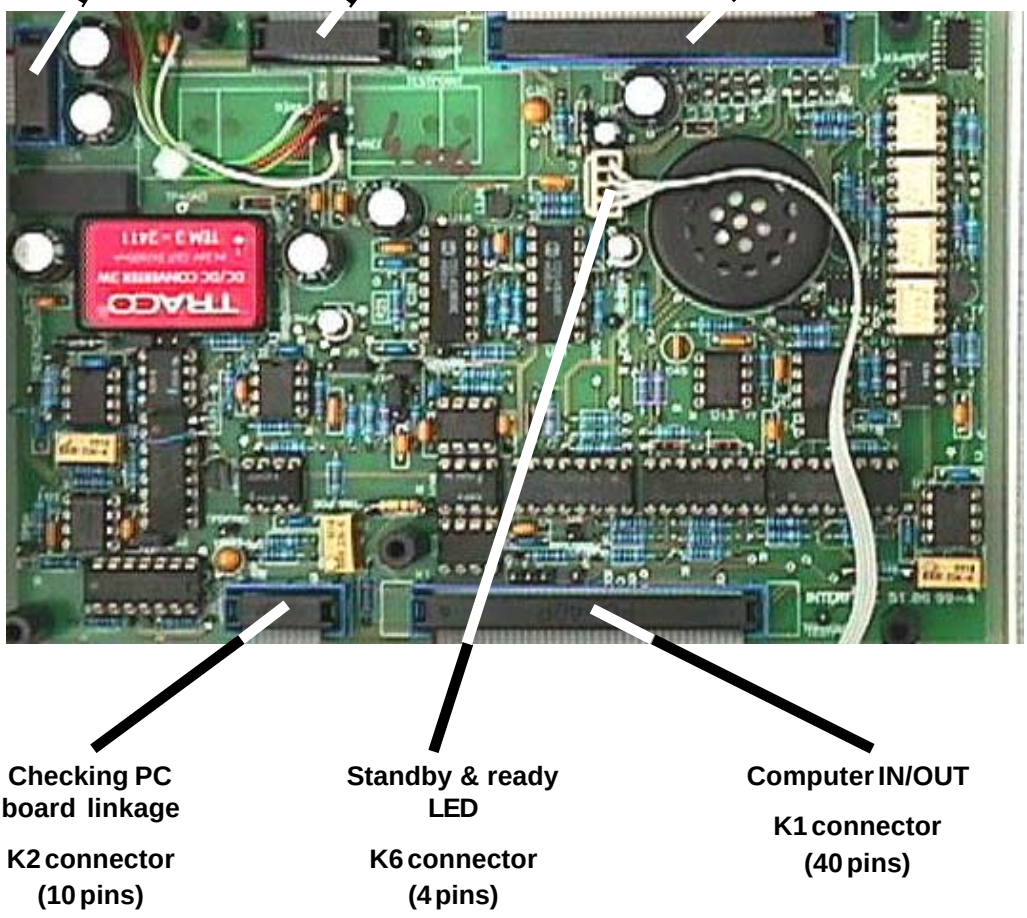
3-1 CPU BOARD



Connector	Pin	Signal
X1	1 - 40	Interface board linkage
X2	1 ; 3	Power supply (+24V)
	2 ; 4	Power supply (GND)
	5	Power supply (+12V)
	6	Ground A
	7 ; 9	Power
	8 ; 10	Ground
X4	1 - 9	Serial linkage connected at a computer
X8	1 - 16	LCD display
X9	1 - 10	Keyboard

3 - LOCATION & CONNECTOR PINS DESCRIPTION

3-2 INTERFACE BOARD



3 - LOCATION & CONNECTOR PINS DESCRIPTION

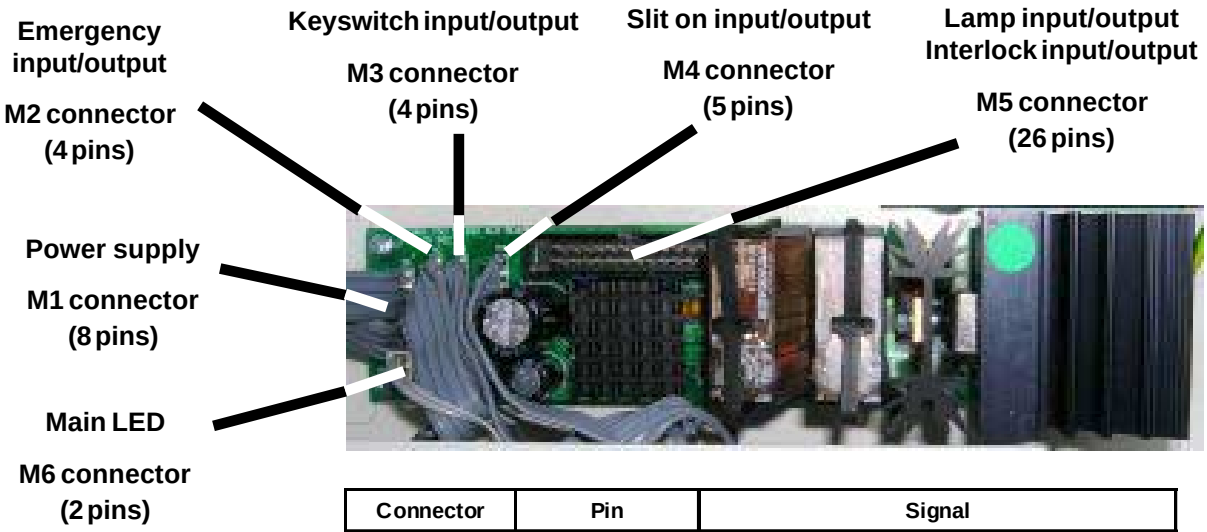
Connector	Pin	Signal
K1	1	Inhibition input
	2	LED input
	3	Gain input
	5	Trigger input
	9	Shutter output (normaly opened)
	10	Shutter output (normaly closed)
	11	Joystick 1 (or footswitch 1) output
	12	Joystick 2 (or footswitch 2) output
	13	Slit lamp output
	14	Interlock output
	19	Filter output
	20	Energy output
	21	High voltage output
	25	UCALC
	26	1 pulse input
	28	2 pulses input
	30	System status (error message control)
	31	INT
	33	SLC
	34	SDA
	36	Warning buzzer
	38	Error output
	24 ; 32 ; 37 ; 40	Ground
	4 ; 6 - 8 ; 15 - 18 ; 22 ; 23 ; 35 ; 39	No connected
K2	1 ; 3 ; 5	Power supply (+5V)
	2 ; 4 ; 6	Ground
K3	1 ; 3 ; 5 ; 7	Ground
	2 ; 4 ; 6 ; 8	Power input (+24V)
	9	Joystick 1
	10	Joystick 2
K4	1 ; 2 ; 13 ; 14	Power supply (+24V)
	3	Power supply inhibition output
	4	1 pulse output
	5	2 pulses output
	6	Power supply reference
	7	High voltage input
	8 - 12	Ground
	15 ; 16	No connected

3 - LOCATION & CONNECTOR PINS DESCRIPTION

Connector	Pin	Signal
K5	1	Footswitch (+Vcc)
	2	Footswitch 1
	3	Footswitch 2
	4 - 7	No connected
	8 ; 24	SCL slave
	9 ; 12 ; 21	Power supply display
	10	Switch
	11 ; 28	SDA slave
	13 ; 14 ; 35 ; 40	Ground
	15	Trigger pulse (+Vcc)
	16	Trigger pulse (ground)
	17	Interlock (+Vcc)
	18	Energy (+Vcc)
	19	Filter input
	20	Energy (ground)
	22	Shutter (+Vcc)
	23	Shutter input (normaly closed : +Vcc)
	25	Shutter ground
	26	Shutter input (normaly opened : +Vcc)
	27	Shutter (ground)
	29	Slit (+Vcc)
	30	Power supply (+12V) of the aiming beam
	31	Interlock input (+Vcc)
	32	Interlock ground
	33	Power supply (0V) of the aiming beam
	34	Gain output
	36	Energy (ground)
	37	Energy input
	38	Energy reference
	39	Energy reset
K6	1	Power supply (+5V) of the LED
	2	Standby LED
	3	Ready LED
	4	Power supply (ground) of the LED
K7	1	Power supply (+24V) of the external speaker
	2	Power supply (ground) of the external speaker

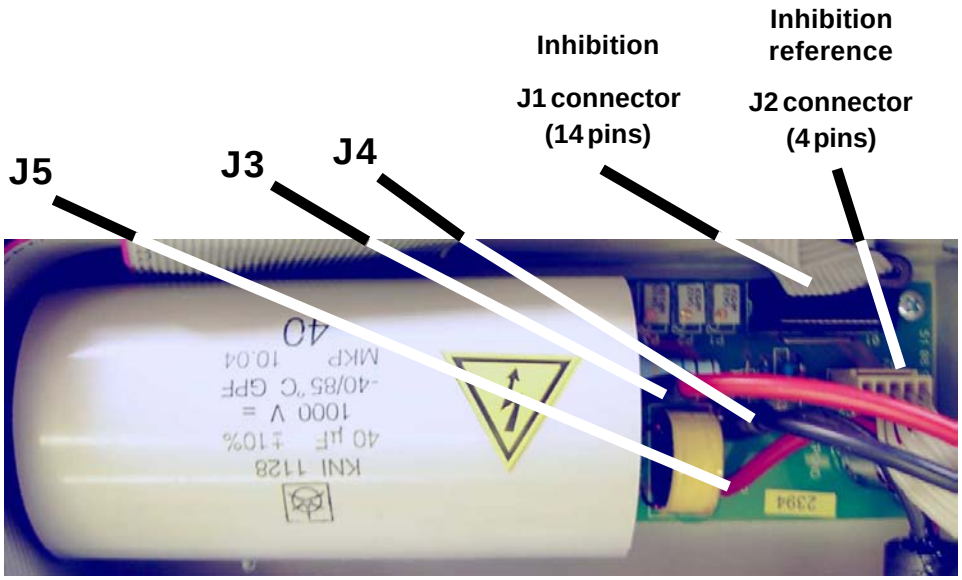
3 - LOCATION & CONNECTOR PINS DESCRIPTION

3-3 AUXILIARY BOARD



Connector	Pin	Signal
M1	1 ; 2	Power supply input (+24V)
	3 ; 4	Power supply input (ground for 24V)
	5 ; 6	Power supply input (+12V)
	7 ; 8	Power suply input (ground for 12V)
M2	1	Panic 1 (+24V)
	2	Panic 1
	3	Panic 2 (ground)
	4	Panic 2
M3	1 ; 2	Key 1
	3 ; 4	Key 2
M4	1	Lamp on
	2	Lamp on (ground)
	3	10K linear potentiometer
	4	10K linear potentiometer
	5	10K linear potentiometer (ground)
M5	1 ; 3 ; 5 ; 7	Power supply output (ground)
	2 ; 4 ; 6 ; 8	Power supply output (+24V)
	9 ; 10 ; 25 ; 26	No connected
	11 ; 13 ; 15 ; 17	Lamp (ground)
	12 ; 14 ; 16 ; 18	Lamp
	19	Fixation lamp
	20	Fixation lamp (ground)
	21	Interlock
	22	Interlock (ground)
	23 ; 24	Viridis input
M6	1	LED main
	2	LED main (ground)

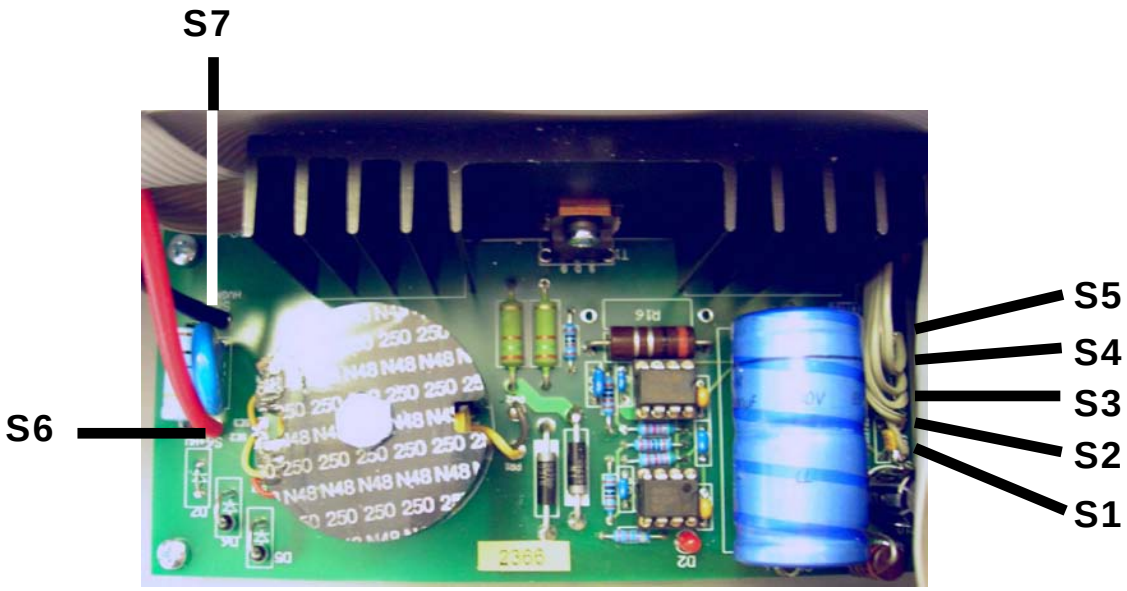
3-4 HV CAPACITOR BOARD



Connector	Pin	Signal
J1	1 ; 2 ; 13 ; 14	Power supply input (+24V)
	3	Inhibition
	4	1 pulse voltage
	5	2 pulses voltage
	6	Reference output following the pulses number
	7	High voltage input
	8 - 12	Power supply input (ground)
J2	1	Power supply input (+24V)
	2	Power supply input (ground)
	3	Reference high voltage (+)
	4	Reference high voltage
	5	Inhibition
J3	1	High voltage power supply
J4	1	High voltage ground
J5	1	High voltage power supply
J6	1	High voltage ground

3 - LOCATION & CONNECTOR PINS DESCRIPTION

3-5 HV POWER SUPPLY BOARD



Connector	Pin	Signal
S1	1	Power supply input (+24V)
S2	1	Power supply input (ground)
S3	1	Ref+
S4	1	Ref
S5	1	Inhibit
S6	1	High voltage out
S7	1	High voltage (ground)

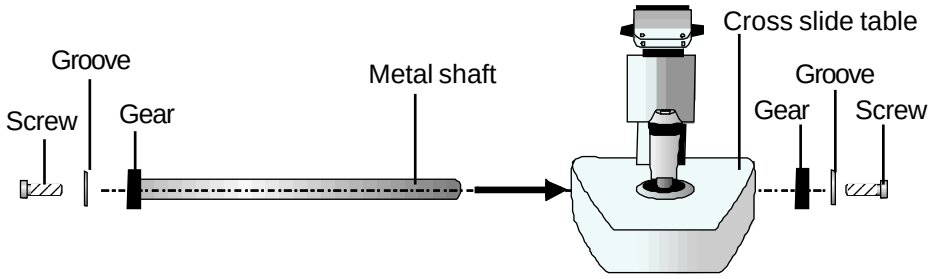
CHAPTER 4

INSTALLATION

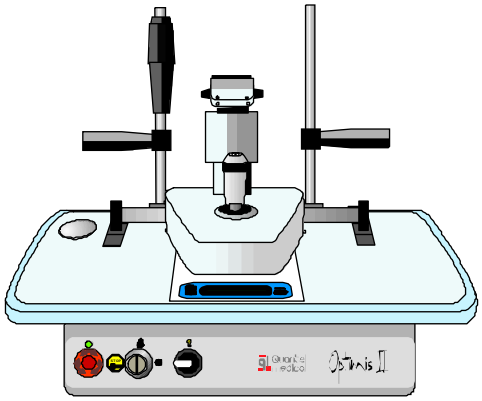
4 - INSTALLATION

a) Place the chinrest and screw it on the table with the two long six-point socket screws.

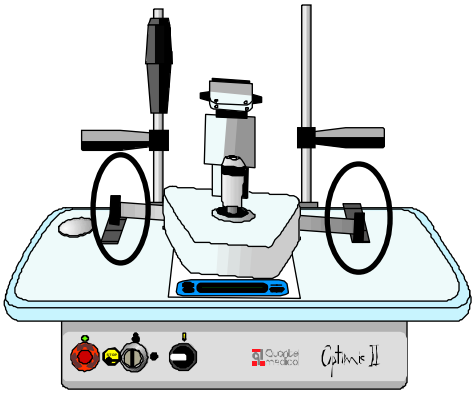
b) Insert a metal shaft in the hole at the side of cross-slide table.
Position two pieces of gears at both ends of the metal shaft and fix it with six-point socket screws, placing a groove between each gear and groove.



c) Place the slit lamp on the table.
Position the gears correctly on the rack of the table to avoid malfunction of the cross-slide table.
Make certain that bottom sides (viewed from operator) of the cross-slide table are parallel to the side-lines of white plate. In the opposite case the table can not move.

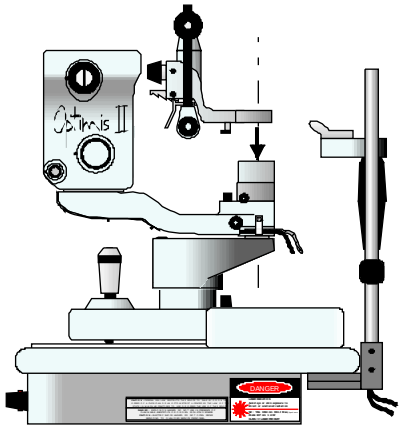


Good position

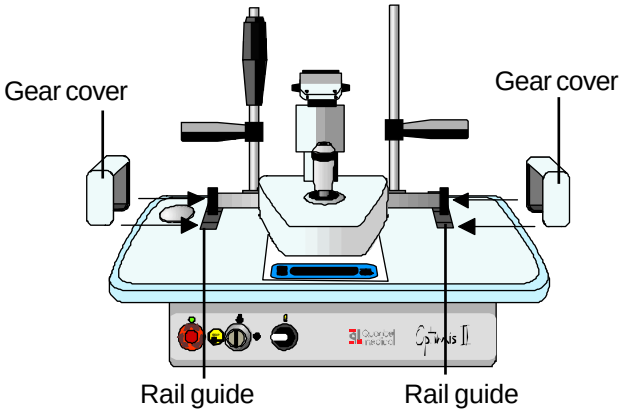


Bad position

d) Place the slit generator axis on the slit lamp axis and screw it.

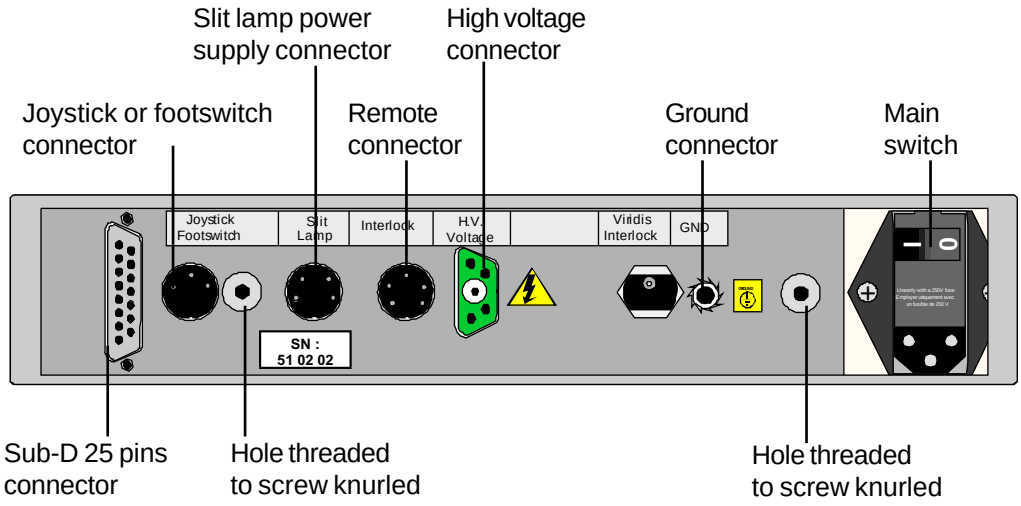


e) Place the both gear covers sliding it under the rail guides of the cross slide table.

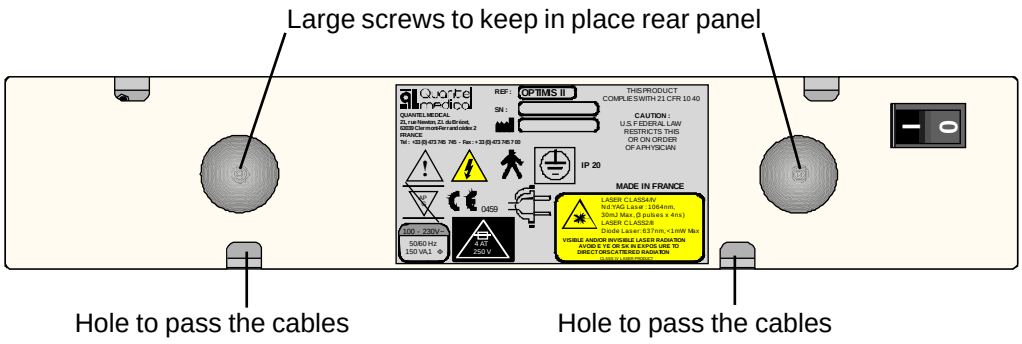


f) Connect the following cables and remote :

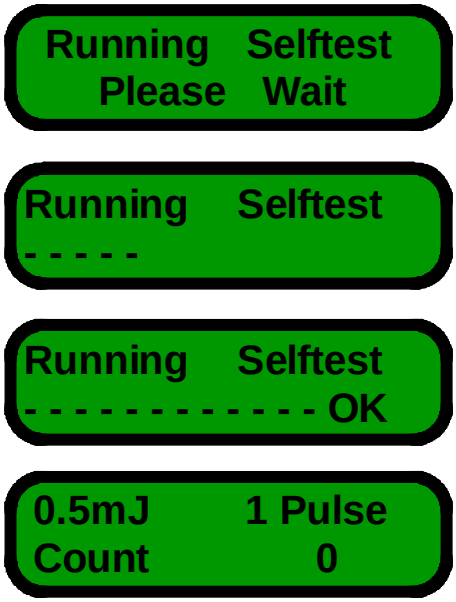
- Sub-D 25 cable
- Slit Lamp cable
- High voltage cable
- Ground cable
- Power supply cable
- Joystick interlink cable or footswitch cable
- Remote



g) Close the rear panel with the large screws passing the cables in the holes on the rear panel.



i) Switch On the master switch.
Check the panic switch is not activated.
Turn the key to ON, the following screens will be displayed :



To check OPTIMIS II after installation, see chapter 8-1
"**CHECKING AFTER INSTALLATION"**.

CHAPTER 5

SERVICE MODE

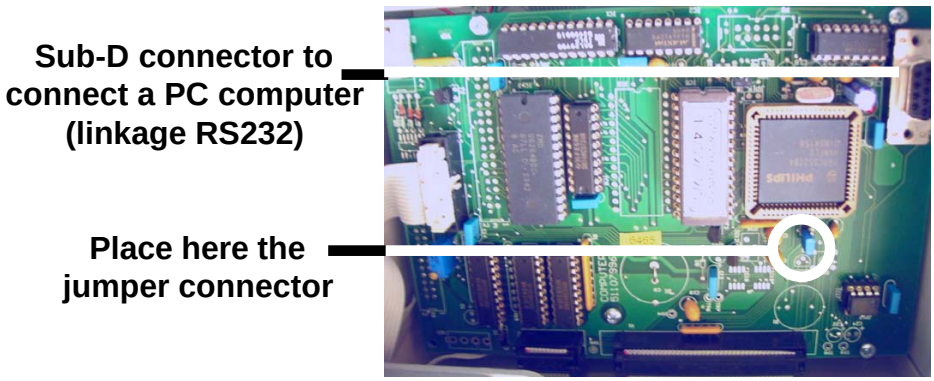
5 - SERVICE MODE

5-1 ACCESSING SERVICE MODE

Accessing the SERVICE mode is only possible after opening the laser console.

To access at the service mode :

- Insert jumper connector on the CPU board,
- Turn On the key : the laser is in service mode.

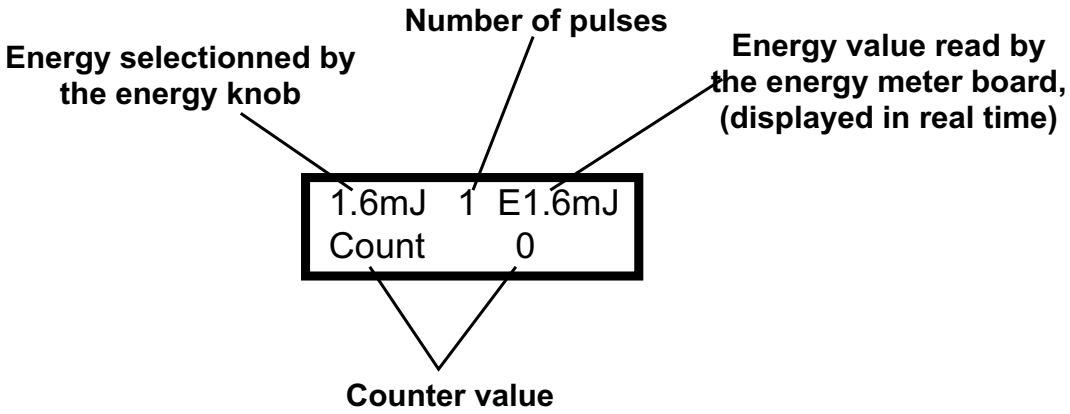


5-2 SCREEN IN SERVICE MODE

When the OPTIMIS II is in service mode, the energy value is measured by the cell of the energymeter board and displayed in real time on the OPTIMIS II screen.

You can check if the measured energy is in the safety windows (+20%, -20% and -50%).

Screen in service mode, when you pulse :


Number of pulses
Energy selectionned by the energy knob
Energy value read by the energy meter board, (displayed in real time)
1.6mJ 1 E1.6mJ
Count 0
Counter value

5-3 DEFECTS AND SOLUTIONS LIST

Message	Explanation and solutions
Remove Slit Lamp	The slit generator is in front of the treatment beam. To pulse, the generator must be on a side. When you remove generator, a Bip is emitted and you can pulse.
Energy > 3.0mJ	When you turn ON the key, the selected energy must be inferior to 5.0 mJ if you want the laser start (safety). - Adjust energy at a lower value.
Error 10	Shutter error. - Check the shutter position. - Check the shutter control. - Check / change the shutter.
Error 11	A too LOW power is measured by the energymeter: below (-50 %) the expected one **Service :** - Select the service mode. - Check the displayed energy and real energy with a joulemeter. - Adjust the potentiometers of the energymeter board (calibration). - Change and adjust the energymeter board. - Adjust the cavity of the laser head.
Error 12	A too HIGH power is measured : over (+20 %) the expected one **Service :** - Select the service mode. - Check the displayed energy and real energy with a joulemeter. - Adjust the potentiometers of the energymeter board. - Change and adjust the energymeter board. - Adjust the cavity of the laser head.
Error 13	High voltage error. **Service :** - Measure the high voltage values and re-adjust it with the 3 potentiometers. Call the Quantel Medical Technical Department to know the different values of voltage for 1, 2 and 3 pulses. - Change the high voltage capacitor board. - Change the high voltage power supply.
Error 14	Transmission decoder error. - Call for service.

No error message but : Key is activated and screen is turned OFF.

The remote circuit is open or is not properly closed (door or other safety device).
- Close the remote circuit (door or other safety device : Yag 532nm delivery system in 532nm position).
Check the remote control connection.

5-4 QUIT THE SERVICE MODE

PROCEDURE :

1 - Remove the jumper connector of the CPU board.

2 - Select 0.5mJ with the energy knob.

3 - Turn the key to ON.

4 - The laser will pass automatically in normal mode.

CAUTION : if you forget to select 0.5mJ with the energy knob, the laser will stay in service mode : - the measured energy will display on the screen,
- the energy safeties will not activated.

CHAPTER 6

SAFETY EXPLANATION

Safeties are activated in normal mode, when a safety is activated the laser is turned OFF.

The CPU Board checks the different safeties :

- trigger safety,
- energy safety,
- shutter safety,
- joystick safety,
- knob position safety (energy and focus),
- slit lamp safety
- room doorswitch.

6-1 TRIGGER SAFETY **(software and hardware safeties)**

The trigger safety checks value of the high voltage.
If the value of the high voltage is equal at the reference voltage adjusted for 1 pulse, 2 pulses and 3 pulses : the laser can pulse.

If the measured value is different of the reference value, two actions are made in the same time :
- software action : error 13 (high voltage error), it is the normal defect.
- hardware action : error 10 (shutter error), it is the hardware detection which activates the shutter : the laser cannot pulse.

NOTE : Only one error message is displayed.

6-2 ENERGY SAFETY (software and hardware safeties)

When you press the joystick, the measured energy is checked by the energymeter board.
If the measured energy is different of the wanted energy, the laser can not pulse and the following message will be displayed :

Error 11 (Energy too low)
or **Error 12** (Energy too high)

Software safety :

The energy is tested at +20% and -50% in software :
- energy inside the windows (+20% and - 20%) : no action,
- energy inside the windows -20% and -50% : the measured value is displayed,
- energy outside the windows (+20% and -50%), an error message is displayed and the laser cannot pulse.

Hardware safety :

The energy is tested at +20% and -50% in hardware, if you are outside the windows, the shutter goes in front of the beam :
The laser cannot pulse and the following error message is displayed : **Error 10**.

Example :

Energy displayed on the Optimis screen	Energy measured by energymeter board	Error message	hardware or software safety
3.0 mJ	2.5 mJ	No error message	software safety
3.0 mJ	2.0 mJ	Value 2.0mJ displayed on the Optimis screen	
3.0 mJ	1.2 mJ	Error 11	
3.0 mJ	3.5 mJ	No error message	
3.0 mJ	4.0 mJ	Error 12	
3.0 mJ	1.2 mJ	Error 10	hardware safety
3.0 mJ	4.0 mJ	Error 10	

6-3 SHUTTER SAFETY (software safety)

When you press the joystick, the position of the shutter is checked.

If the shutter is not in the correct position, the following message will be displayed :

- **error 10** (shutter error) : the laser can not pulse.

6-4 JOYSTICK SAFETY

The impulsion joystick will directly activate the laser (no software action), only if the following hardware conditions are validated :

- shutter opened,
- high voltage is at the correct level.

No error message is displayed but the laser does not pulse.

6-5 KNOB POSITION SAFETY (software safety)

The knobs position are checked :
- energy knob,
- focus knob.

If one of the two knobs (energy or focus) is not correctly positioned, the laser does not work and the following message will be displayed :

- **Check knob position.**

6-6 SLIT LAMP SAFETY (software safety)

If the slit lamp is in front of the laser output, the laser cannot pulse and the laser is turned Off (the screen is also turned Off).

6-7 ROOM DOORSWITCH SAFETY (software safety)

If the remote is activated by +24V, the laser cannot pulse.

CHAPTER 7

ELECTRONIC ADJUSTMENTS

7 - ELECTRONIC ADJUSTMENTS

7-1 ENERGY SAFETY

When you press the joystick, the energy is measured by the energymeter board.

If the measured energy is different of the wanted energy, the laser can not pulse and the following message will be displayed :

Error 11 : energy too low
or **Error 12** : energy too high

The energy is tested at +20% and -50% in software, if the energy measured is not inside the windows (+20% and -50%), the laser cannot pulse and an error message will be displayed.

- Select the service mode,
- Check the displayed energy,
- Adjust the potentiometers of the energymeter board.

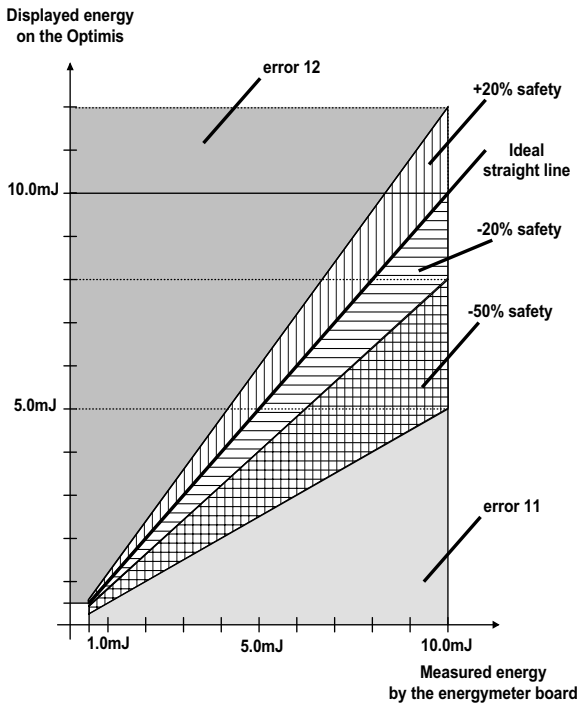
7-2 ENERGYMETER CALIBRATION

Two potentiometers are available on the **energymeter board** :

- P1 is used to adjust measured energy at lowest energy : turning P1 clockwise, increases measured energy to bring it up to the desired value.
- P2 is used to adjust measured energy in max energy : turning P2 clockwise, increases measured energy to bring it up to the desired value.

Calibration of potentiometers :
- P1 is used to set the safety between 0.5mJ and 3.0mJ.
- P2 is used to set the safety between 3.0mJ and 10.0mJ.

Usually the calibration is performed at two energy levels :
- 10mJ for the high power (P2) : first adjustment
- 3mJ for the low power (P1) : second adjustment



The measured energy must be between +20% :

See following table :

Burst mode : 1 pulse										
Energy displayed (mJ)	0.5	0.7	1.0	1.3	1.6	2.0	3.0	5.0	7.0	10.0
Tolerance +20%	0.7	1.0	1.2	1.6	1.9	2.4	3.6	6.0	8.4	12.0
Tolerance - 20%	0.3	0.5	0.8	1.0	1.3	1.6	2.4	4.0	5.6	8.0

- Check the calibration in Burst mode 2 and 3 pulses.

- The critical point of the calibration is about 3mJ in 1, 2 and 3 pulses.

CAUTION : Always adjust P2 in first time, it is the reference point for high energy calibration. But when you adjust P2, you change the low calibration, so you must re-adjust P1.

7-3 HIGH VOLTAGE CALIBRATION

Three potentiometers are available on the **High Voltage Capacitor Board** :
- P3 is used to adjust the maximum voltage for 3 pulses. (first adjustment)
- P2 is used to adjust the voltage value for 2 pulses, (second adjustment)
- P1 is used to adjust the voltage value for 1 pulse, (third adjustment)

NOTE : when you touch P3, you change the voltage value of 3 pulses, but you change also the voltage value of 1 pulse and 2 pulses.

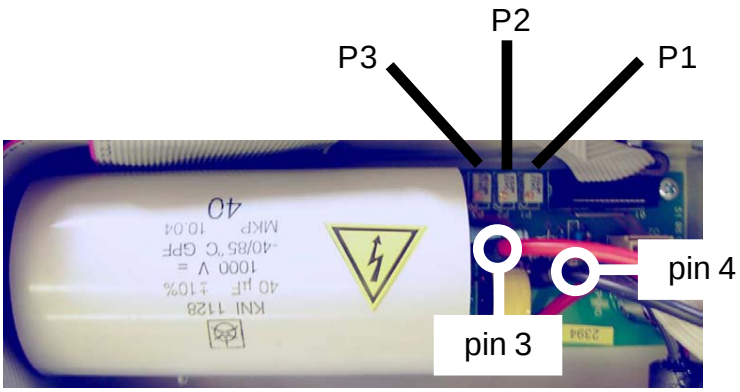
CAUTION : You must adjust these three potentiometers only when the High Voltage Capacitor Board has been replaced.
Contact the Quantel Medical Technical Department to know and check the different voltage values following the different pulses.
(1pulse, 2 pulses and 3 pulses).

7 - ELECTRONIC ADJUSTMENTS

Procedure to check the values of the 3 potentiometers :

- Connect the voltmeter between the pin 3 and the pin 4.
  (pin 3 is the power supply and pin 4 is the ground)
- Turn On the unit (in service mode).
- Select the ready mode and check the different high voltage value for the different pulses at cold and at warm laser.
- Select 3 pulses and ready mode. Check the high voltage value (nearly 900V).
- Select 2 pulses and ready mode. Check the high voltage value (nearly 750V).
- Select 1 pulse and ready mode. Check the high voltage value (nearly 600V).

If a value does not correspond to theoretical value, contact Quantel Médical to know and check the different voltage values following the different pulses. (1 pulse, 2 pulses and 3 pulses).



Theoretical range of the differents pulses :

Number of pulses	1 pulse	2 pulses	3 pulses
Minimum High Voltage Value	500 V	650 V	800 V
Maximum High Voltage Value	650 V	800 V	920 V
CAUTION : If the High Voltage value is > 920 V, the number of pulses will be 4			

By example, we have checked the values on a device, at cold laser and at warm laser.

For 1 pulse : - at cold laser, we measured 540 V.
- at warm laser, we measured 565 V.

To get these values, the P1 potentiometer has been adjusted at nearly 618V.

For 2 pulses : - at cold laser, we measured 760V.
- at warm laser, we measured 765 V.

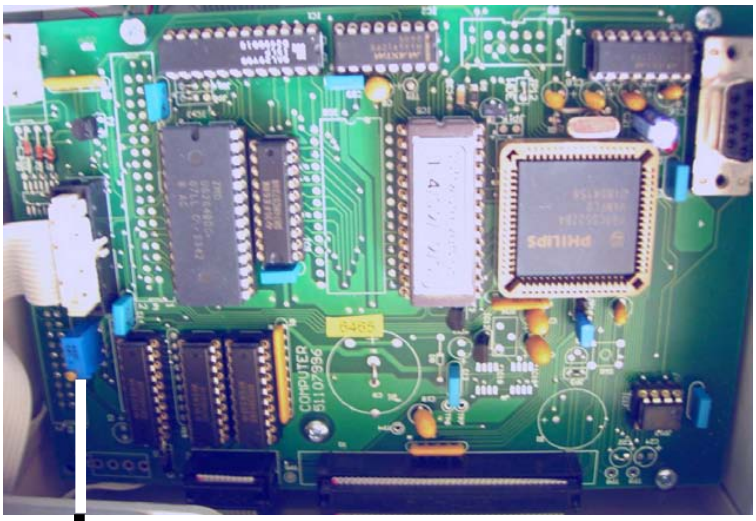
To get these values, the P2 potentiometer has been adjusted at nearly 780V.

For 3 pulses : - at cold laser, we measured 870V.
- at warm laser, we measured 910V.

To get these values, the P3 potentiometer has been adjusted at nearly 910V.

7-4 DISPLAY CONTRAST ADJUSTMENT

To improve the display contrast, you must use the R27 potentiometer on the CPU Board.



R27 Potentiometer

CHAPTER 8

OPTICAL ADJUSTMENTS

8 - OPTICAL ADJUSTMENTS

8-1 CHECKING AFTER INSTALLATION

When the following conditions are completed, OPTIMIS II is OK.

To do this following adjustments, put a sheet of teflon on the chinrest.

8-1-1 SLIT CHECKING

Search the position where the slit is focalized by moving the slit lamp position.
That is to say, the slit lamp position (focus distance) is correct when the slit moves the less as possible by turning the slit generator.

8-1-2 AIMING BEAM CHECKING

Check the aiming beam is focalized and homogeneous when the slit is focalized.

Check the aiming beam is centred on the slit.
(see chapter 9-2 to center the aiming beam).

8-1-3 YAG AND AIMING BEAM CHECKING

Check the YAG beam is superimposed on the aiming beam when you shoot on teflon at :
- energy : 0.5mJ
- focus : 0
- “burst” mode : 1 pulse

(see chapter to superimpose Yag beam on the aiming beam).

8-1-4 FOCUS CHECKING

a) Focus at 0

Adjust Energy at 0.5mJ, select 1 pulse in "Burst" mode.

- Check you make a hole in the teflon when :
  - the aiming beams are superimposed.
  - you set a 0 value of focus.

- Check you do not make a hole in the teflon, when :
  - the aiming beams are superimposed,
  - You set a 1 value of focus and a 2 value of focus.

b) Focus at 1 and 2

Adjust Energy at 0.5mJ, select 1 pulse in "Burst" mode.

It is necessary to defocus the slit lamp to make a hole in the teflon :
- Focus at 1 : shift of 100 microns from focus position 0
- Focus at 2 : shift of 200 microns from focus position 0

8-1-5 LASER MODE CHECKING

The shape of the impact must be as round as possible.

Adjust Energy at minimum 10mJ and 0 focus.
Shot on a thermosensitive sheet with a backward defocus.
Check the impact on the thermosensitive sheet.

Example of ideal impact :

Check the impact is the same following different pulses of the burst mode (1, 2 and 3 pulses).

8-1-6 ENERGY CHECKING

First checking :
Adjust the energy knob at 3mJ or 5mJ. Select 1 pulse.
When the laser is firing you should observe a "spark" at the focus plane and hear it.

Second checking :
You must check the energy with an energymeter (or scopmeter with a Genter cell) :
The energy readings must be in the range of the limit values which are indicated in the following chart :

Burst mode : 1 pulse										
Energy displayed (mJ)	0.5	0.7	1.0	1.3	1.6	2.0	3.0	5.0	7.0	10.0
Tolerance +20%	0.7	1.0	1.2	1.6	1.9	2.4	3.6	6.0	8.4	12.0
Tolerance - 20%	0.3	0.5	0.8	1.0	1.3	1.6	2.4	4.0	5.6	8.0
Energy										

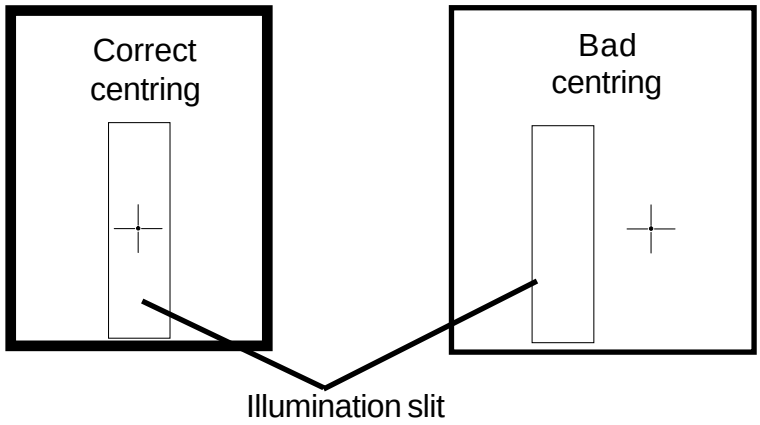
8-2 AIMING BEAM ADJUSTMENTS

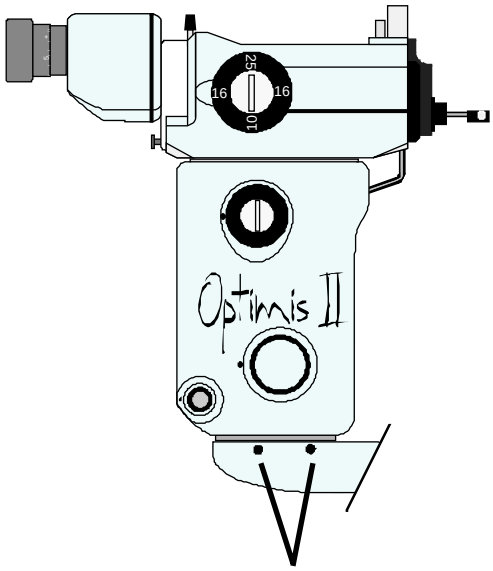
BASIC ADJUSTMENTS

8-2-1 AIMING BEAM (AND CROSS IF AVAILABLE) CENTRING IN THE SLIT

CAUTION : Do not change the focus distance of the slit lamp (locked).

NOTE : When you move the laser head, you move the Yag beam and aiming beam in the same time.





Horizontal adjustment by using the 2 screws on each opposite side. (push-pull system).

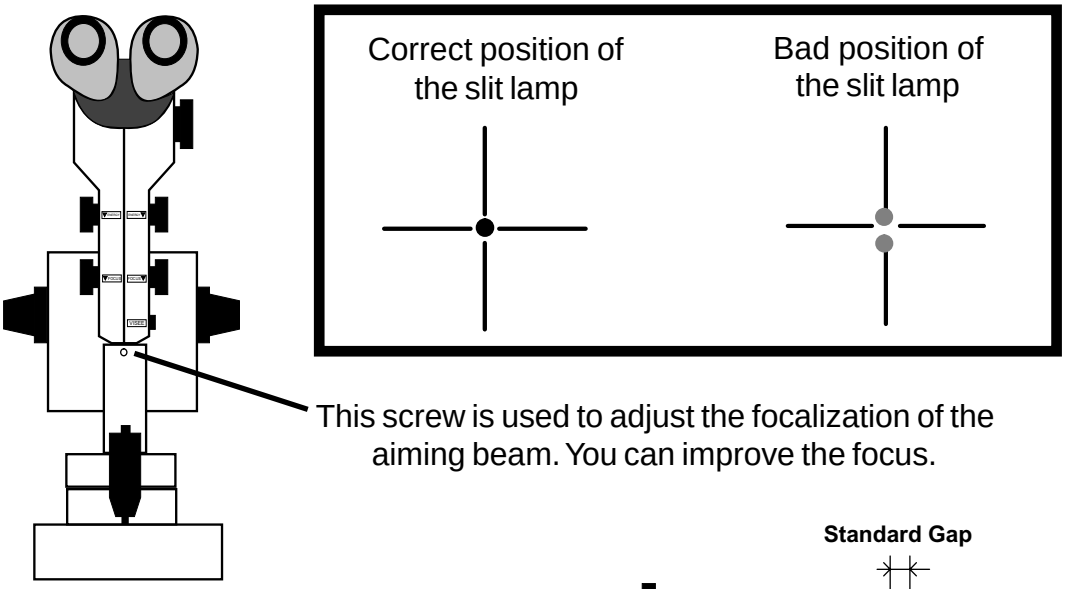
The adjustments of the chapters 8-2-1 and 8-2-2 are interactive.

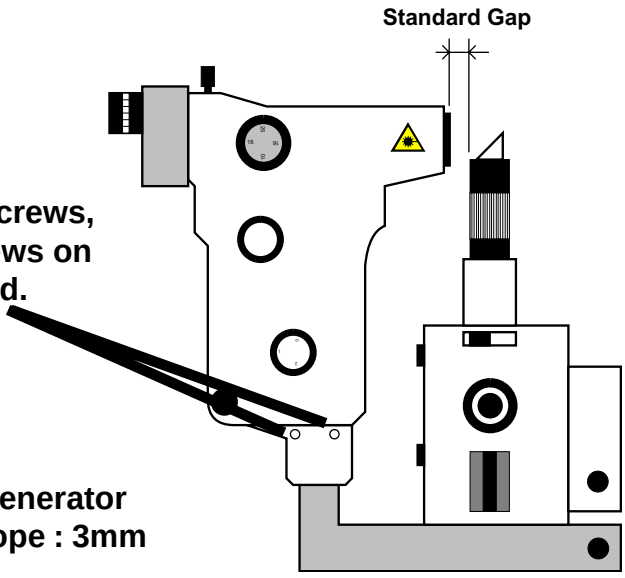
8-2-2 AIMING BEAM FOCALIZED AND SHARP

CAUTION : Do not change the focus distance of the slit lamp (locked).

NOTE : When you move the laser head, you move the Yag beam and aiming beam in the same time.

Search the position of the laser head where the aiming beam is the more sharp as possible and where the two beams are superimposed, to do one aiming beam.


Correct position of the slit lamp
Bad position of the slit lamp
This screw is used to adjust the focalization of the aiming beam. You can improve the focus.



Before touching the above screws, you must untighten two screws on one side of the laser head.

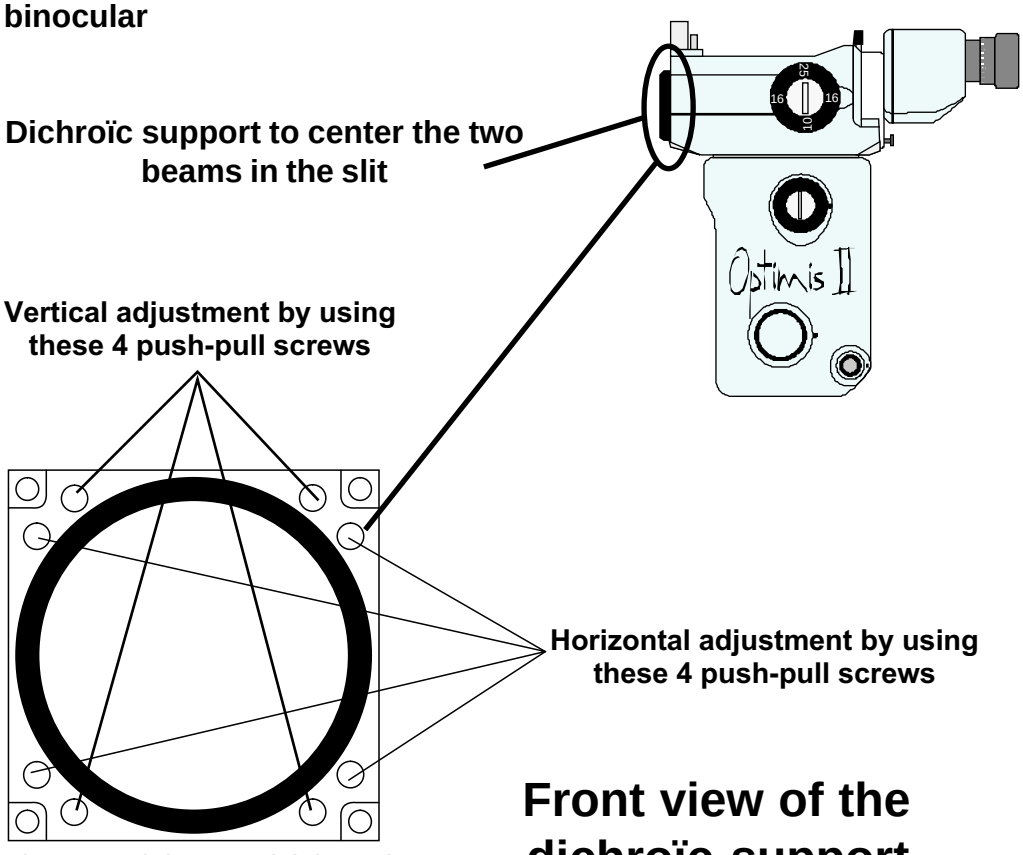
Standard Gap between Slit Generator and Objective of biomicroscope : 3mm

NOTE : The final adjustment must be obtained when all screws are tightened.

ADVANCED ADJUSTMENTS

8-2-3 AIMING BEAM CENTRING IN THE BINOCULAR CROSS

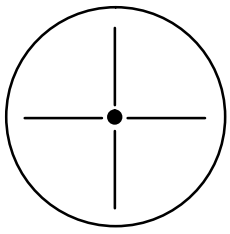
You can center the aiming beam in the binocular cross with the dichroïc support.
If the cross is not present, you must center the aiming beam in the binocular


Dichroïc support to center the two beams in the slit
Vertical adjustment by using these 4 push-pull screws
Horizontal adjustment by using these 4 push-pull screws
Optimis II

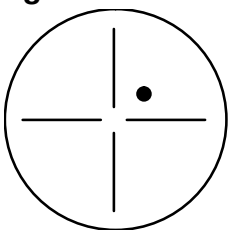
Always untighten and tighten the opposite screws.

Front view of the dichroïc support

Correct position : aiming beam centred



Bad position : aiming beam not centred



Note : The final adjustment must be obtained when all screws are tightened.

8-2-4 AIMING BEAM NOT SUPERPOSED ON THE YAG BEAM

Conditions to do this adjustment : - Slit focalized,
- Aiming beam focalized,
- Yag beam focalized,
- Aiming beam not superimposed on the Yag beam.

a) First solution (easy) :

Try to superimpose the Yag beam on the aiming beam : touch slightly the M1 mirror.

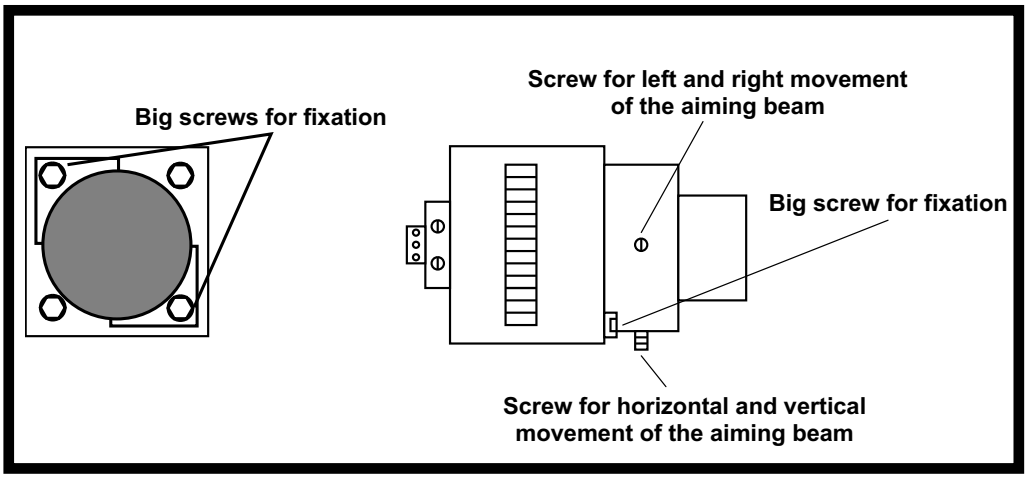
Cautions : If you touch the M1 mirror, you can dis-adjust the Yag beam (change the shape of the impact, the 3 defocus positions and you can loose energy).

b) Second solution : Aiming beam holder adjustment (difficult) :

You must superimposed the aiming beam on the Yag beam.

Cautions : Do this adjustment only, if the aiming beam is not superimposed on the Yag beam.

Aiming beam holder :


Big screws for fixation
Screw for left and right movement of the aiming beam
Big screw for fixation
Screw for horizontal and vertical movement of the aiming beam

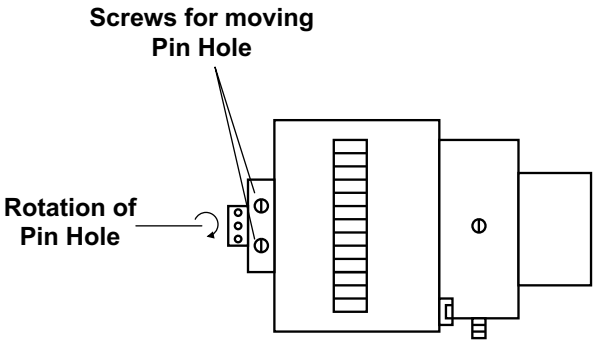
Cautions: To move the aiming beam in the slit (without move the Yag beam), you must use these two screws, but you must unscrew the big screws, for the movements are efficient.
You have two big opposite screws.

8-2-5 PIN HOLE ADJUSTMENT

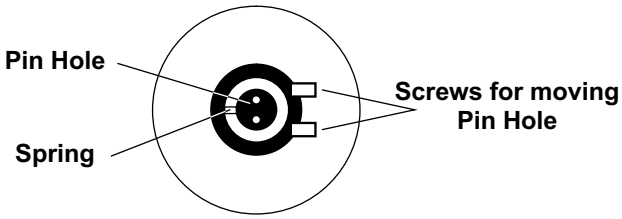
Conditions to do this adjustment :

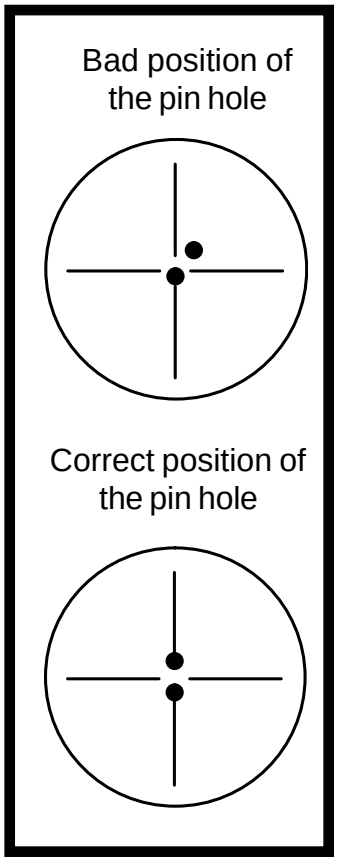
- Slit focalized,
- Aiming beam focalized,
- Yag beam focalized,
- Aiming beam superimposed on the Yag beam,
- Two aiming beams are not vertically aligned.

The Pin Hole is used to create two aiming beams.
Put a sheet of paper front of the objective of the biomicroscope and you check the aiming beam on it : centring, two aiming beams aligned.



Front view of aiming beam holder





When you tighten and untighten one of these two screws, you move the Pin Hole and you change the vertical alignment of the two aiming beams.

Caution: **When you move the Pin Hole, you can loose of intensity beam and modify the centring, you must adjust again the aiming beam holder (refer previous chapter 9-2-4- to improve it).**

8-2-6 FOCUS ADJUSTMENT OF THE AIMING BEAM

Principle : Get the Yag and Aiming Beams on the same focus plane.

- Adjust the position of the slit lamp to get a focus aiming beam (one spot).
- Shot and verify the Yag beam is efficient.
The Yag beam must make a hole where the aiming is placed before shooting.

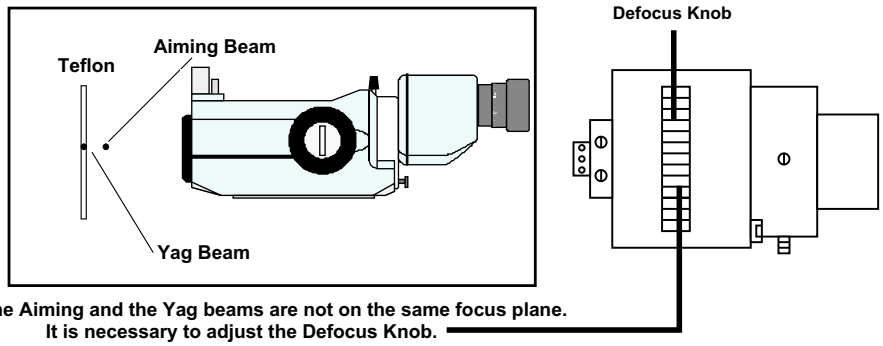
If it is not OK, adjust the slit lamp position to make a hole when firing.

Adjust the above defocus knob to get a focus aiming beam.

Setting parameters :
- energy : 0.5mJ,
- focus : 0,
- “burst” mode : 1 pulse.

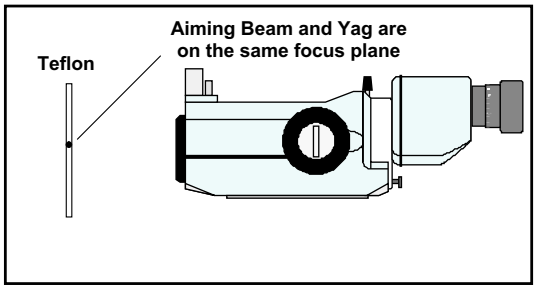
Side Views

Bad



Above, the Aiming and the Yag beams are not on the same focus plane. It is necessary to adjust the Defocus Knob.

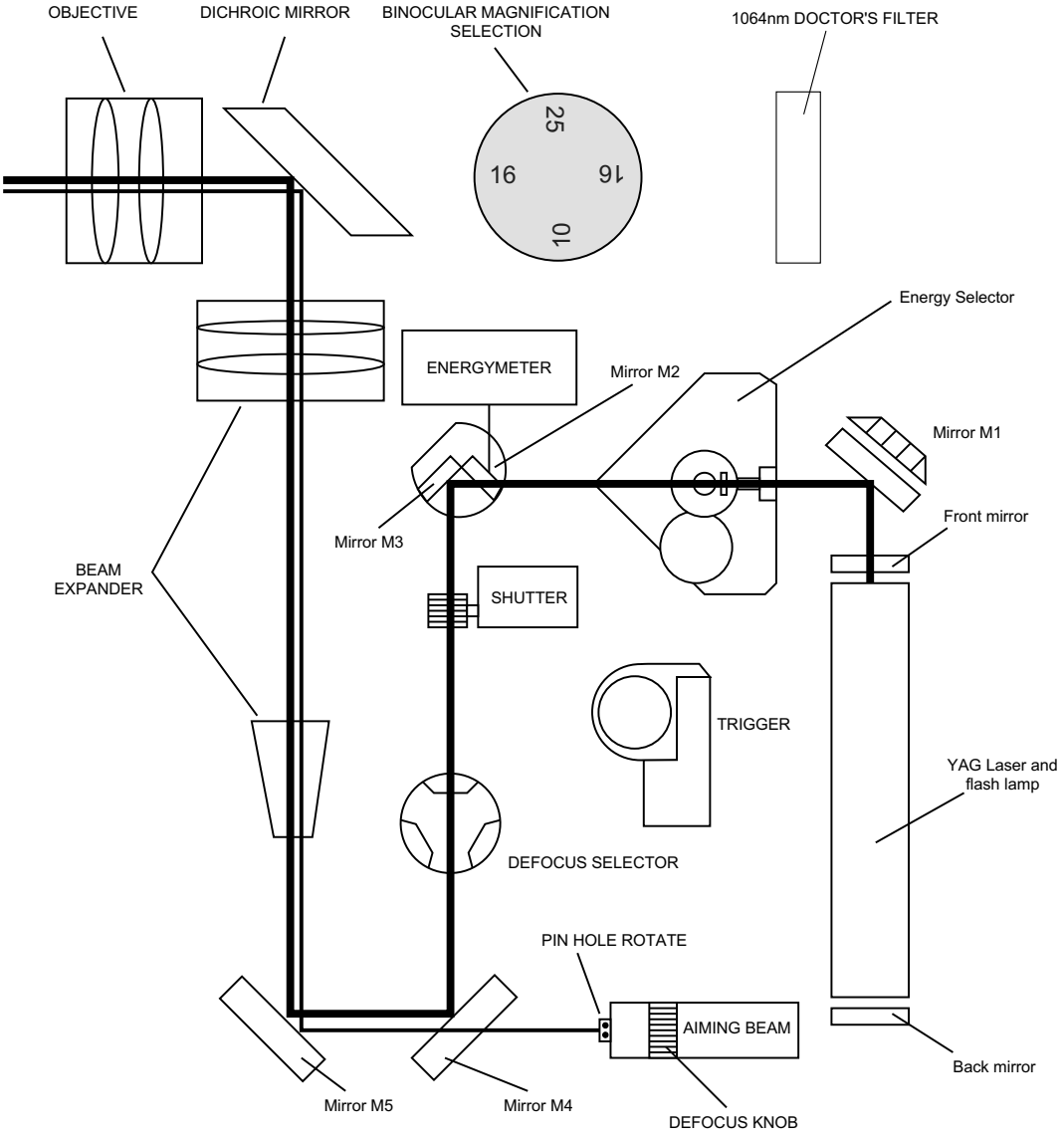
Correct



The defocus is adjusted at 30µm. Touch the defocus knob, if you are self-confident.

8-3 YAG ADJUSTMENT

a) Optic cavity diagram :



b) Adjustment procedure :

To improve the energy distribution of the Yag beam at the objective output :

Conditions to do this adjustment :

- Slit focalized,
- Aiming beam focalized,
- Yag beam focalized on aiming beam when you pulse with a 0 focus,
- Yag impact not correct.

First adjustment :

If the Yag impact is not circular when you open teflon or the laser does not create a “spark” at the focus plane, that is to say the Yag beam is not centred in the lens and mirrors, you must move the direction of the Yag beam : you can touch the **M1 mirror.**

Cautions : **When you adjust the M1 mirror, you risk to destroy the energymeter board with the allen key, you risk to do a short-circuit.**

Note : **When you adjust the M1 mirror, you change the direction of the Yag beam, at the end of the adjustment, you must check the Yag beam is superimposed on the aiming beam.**
If it is not the case, you must adjust the aiming beam (see previous pages).

Important : **Mirror M1 changes the direction of the Yag beam.**
After touching the M1 mirror, following the different focus position (focus 0, focus 1 and focus 2) :
- Check the energy (with an energymeter),
(You must have a spark at the focus plane (between 3 and 5mJ)),
- Check the impact on a thermosensitive sheet.

8 - OPTICAL ADJUSTMENTS

Second adjustment : If you are self confident of you.

The back mirror of the cavity can be slightly adjusted : this mirror adjusts the energy and the mode of the laser head.

IMPORTANT : Never touch the Front mirror.

Important : Back mirror changes : - the direction of the Yag beam,
- the mode of the Yag beam.

After touching the back mirror, following the different focus position (focus 0, focus 1 and focus 2) :
- Check the energy (with an energymeter),
(You must have a spark at the focus plane (between 3 and 5mJ)),
- Check the impact on a thermosensitive sheet : impact must be as round as possible.

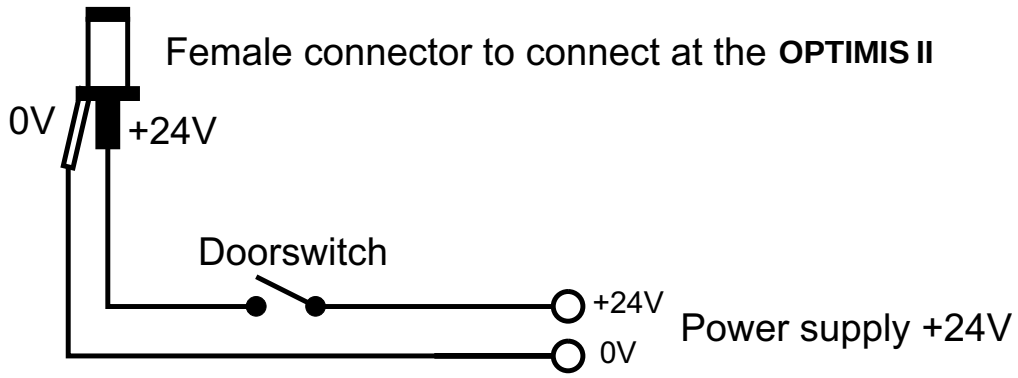
CHAPTER 9

ROOM DOORSWITCH

9 - ROOM DOORSWITCH

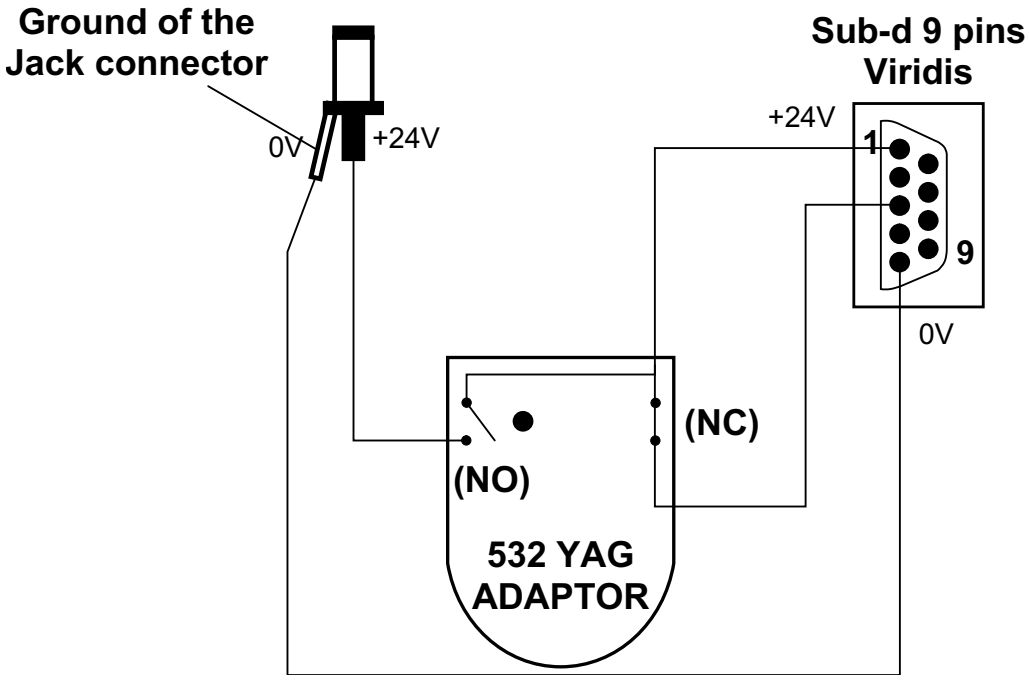
9-1 ROOM DOORSWITCH

Below, schematics to connect OPTIMIS II at the room doorswitch safety.



Note : The polarity is VERY important.

9-2 ROOM DOORSWITCH WITH 532 YAG ADAPTOR



Note : The polarity is VERY important.

CHAPTER 10

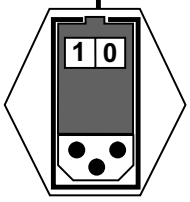
FUSES REPLACEMENT

10 - FUSES REPLACEMENT

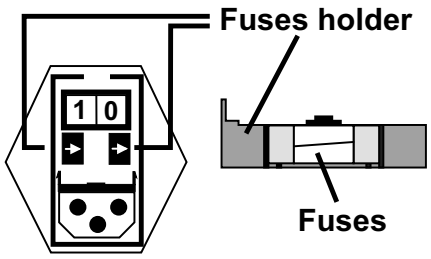
The fuses are on the rear panel

Remove the rear panel (see chapter 2).

Open the trap door with a screwdriver for accessing the mains block fuses at the rear of the instrument



Remove the fuses holder and change the fuses if necessary (250V 4A)



Caution : Respect the way of the fuses holder (pointer toward right).

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